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KEY

TO THE

NEW PRACTICAL ARITHMETIC;

WITH

ANSWERS TO EXERCISES

IN THE

NEW ELEMENTARY ARITHMETIC.

PREPARED FOR THE

MATHEMATICAL SERIES

OF

BENJAMIN GREENLEAF, A. M.

BY A PRACTICAL TEACHER.

BOSTON:
PUBLISHED BY ROBERT S. DAVIS & CO.
NEW YORK: MASON, BAKER, & PRATT, 142 & 144 GRAND ST.
PHILADELPHIA: J. A. BANCROFT AND COMPANY.
ST. LOUIS: HENDRICKS & CHITTENDEN.
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PREFACE.

In deference to the opinion of some good teachers, the editor of the New Practical Arithmetic has been disinclined, either to make, or authorize to be made, a Key to that work.

It appears, however, that there can hardly be a mathematical book of any considerable popularity without a Key in some form. Withholding such a help in this case from the teacher and private learner, has failed of the hoped-for result. It has given occasion for the manufacture of many manuscript keys, and their free use in the school-room.

It has, also, been found that many teachers desire ready access to omitted answers, and that not a few, who are in charge of many pupils, fail of time to examine in detail numerous arithmetical operations, without a hand-book of solutions.

In view of these facts, the preparation of this book, by a practical teacher, was sanctioned.

It gives omitted answers to exercises both in the New Elementary and New Practical Arithmetics. It furnishes operations to exercises in the latter book — not full solutions or entire analyses — so that, while it may be of aid to the teacher, it can hardly be of much avail to the pupil.

Any teacher who will promptly furnish his pupils with all needed assistance, and who has the moral power to enforce precepts, need not, it is believed, fear any surreptitious use of Keys in his school.

Kingston, Mass., May, 1867.

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KEY

TO

NEW PRACTICAL ARITHMETIC.

NOTATION.

(Art. 35, p. 16.)

4.	Ans. 125	12.	Ans. 100,764
5.	796	13.	100,415
6.	89	14.	36,046
7.	997	15.	1,100,100
8.	5,062	16.	151,000,000
9.	55,500	18.	16,741,223,178,000
10.	106,000		

ADDITION.

(Art. 40, pp. 20, 21.)

6.	Ans. 980	18.	Ans. 8,105
7.	6,413	19.	1,286
8.	923	20.	23,284
9.	1,661	22.	111,111
10.	11,239	27.	1,383,458
11.	38,248	28.	341,540
12.	1,869	30.	1,407,770
13.	4,326	31.	47,454
14.	1,586	33.	8,337
15.	2,737		

(Pages 22–24.)

4.	Ans. 3,676	15.	Ans. 4,387
8.	1,560	21.	11,816
10.	21,588	22.	236
12.	152,045		

SUBTRACTION.

(Art. 45, pp. 29, 30.)

6.	Ans. 108	16.	Ans. 6,737
7.	235	22.	45,785
8.	376	26.	3,877
9.	2,802	27.	2,092
10.	459	28.	401
11.	717	33.	98,999,991
12.	1,088	34.	350,185
13.	722		

(Pages 30, 31.)

4.	(In 1867.) 98	13.	24,354
5.	86	15.	4,491
6.	890	17.	1,084,800
11.	1,815		

REVIEW EXERCISES.

(Page 32.)

(5.)

1,575 + 3,600 = 5,175
6,000 — 5,175 = 825 Ans.

(6.)

8,000 + 3,500 + 4,500 = 16,000
24,000 — 16,000 = 8,000 dolls., Ans.

(7.)

16,830 — 9,460 = 7,370

7,370 + 2,000 = 9,370 dolls.

(8.)

125 + 75 + 58 = 258

275 — 258 = 17 dolls.

MULTIPLICATION.

(Art. 51, p. 38.)

9.	Ans. 1,176	18.	Ans. 302,205
10.	38,905	21.	978,609
11.	13,395	27.	542,496
12.	44,256	30.	85,153
15.	24,822	33.	7,245

(37.)

$$\begin{array}{r} 75452 \\ 47 \\ \hline 528164 \\ 301808 \\ \hline 3546244 \end{array}\ \text{Ans.}$$

(38.)

$$\begin{array}{r} 54302 \\ 89 \\ \hline 488718 \\ 434416 \\ \hline 4832878 \end{array}\ \text{Ans.}$$

(39.)

$$\begin{array}{r} 784 \\ 203 \\ \hline 2352 \\ 1568 \\ \hline 159152 \end{array}\ \text{Ans.}$$

(40.)

$$\begin{array}{r} 137 \\ 35 \\ \hline 685 \\ 411 \\ \hline 4795 \end{array}\ \text{Ans.}$$

(41.)

$$\begin{array}{r} 567 \\ 108 \\ \hline 4536 \\ 567 \\ \hline 61236 \end{array}\ \text{Ans.}$$

(42.)

$$\begin{array}{r} 37 \\ 25 \\ \hline 185 \\ 74 \\ \hline 925 \\ 5 \\ \hline 4625 \end{array}\ \text{Ans.}$$

```
(43.)     17
           3
          --
          51
         111
         ---
          51
         51
        51
        ----
        5661 Ans.
```

```
(44.)     7013
          1234
       -------
         28052
        21039
       14026
       7013
       -------
       8654042 Ans.
```

```
(45.)     486
          259
        -----
         4374
        2430
        972
       ------
       125874 Ans.
```

```
(46.)     34618
            259
        -------
         311562
        173090
        69236
        -------
        8966062 Ans.
```

```
(47.)     80704
            432
       --------
         161408
        242112
       322816
       --------
       34864128 Ans.
```

```
(48.)     31311
           1213
       --------
          93933
         31311
        62622
       31311
       --------
       37980243 Ans.
```

```
(49.)      93186
            4455
       ---------
          465930
         465930
        372744
       372744
       ---------
       415143630 Ans.
```

```
(51.)     15607
           3094
       --------
          62428
        140463
        46821
       --------
       48288058 Ans.
```

```
(52.)      60121
            3108
       ---------
          480968
          60121
        180363
       ---------
       186856068 Ans.
```

(55.)
3403
501
3403
17015
1704903 Ans.

(56.)
5121
1002
10242
5121
5131242 Ans.

(57.)
61303
701
61303
429121
42973403 Ans.

(62.)
485
240
1940
970
116400 Ans.

(63.)
36500
730
1095
2555
26645000 Ans.

(64.)
674200
2104
26968
6742
13484
1418516800 Ans.

(Page 41.)

(3.)
24 × 18 = 432 Ans.

(5.)
2463 × 9 = 22167 dolls., Ans.

(8.)
625 × 8 = 5000 Ans.

(12.)
365
24
1460
730
8760
68000
7008
5256
595680000 miles.

DIVISION.

(Art. 62, pp. 47, 48.)

6.	Ans. 503	13.	Ans. $55884\frac{6}{8}$
7.	$2203\frac{2}{8}$	16.	72262
8.	$20424\frac{1}{3}$	18.	$1816141\frac{1}{5}$
11.	30052	21.	1234

(Page 48.)

$2412\frac{1}{2}$ | 7.

(Art. 63, pp. 50, 51.)

4.	Ans. $179\frac{7}{9}$
8.	$546\frac{3}{17}$
10.	$1316\frac{1}{75}$
13.	835
14.	$2671\frac{17}{365}$

(15.) $17)13354(785\frac{9}{17}$

$\underline{119}$

145

$\underline{136}$

94

$\underline{85}$

9

(16.) $62)3406(54\frac{58}{62}$

$\underline{310}$

306

$\underline{248}$

58

(17.) $35)10000(285\frac{25}{35}$

$\underline{70}$

300

$\underline{280}$

200

$\underline{175}$

25

(18.) $110)10064(91\frac{54}{110}$

$\underline{990}$

164

$\underline{110}$

54

(19.) $73)45078(617\frac{37}{73}$

$\underline{438}$

127

$\underline{73}$

548

$\underline{511}$

37

(20.) 222)111111(500$\frac{111}{222}$
1110
111

(21.) 51)60702(1190$\frac{12}{51}$
51
97
51
460
459
12

(22.) 55)13415(243$\frac{50}{55}$
110
241
220
215
165
50

(23.) 121)45630(377$\frac{13}{121}$
363
933
847
860
847
13

(24.) 60)23218(386$\frac{58}{60}$
180
521
480
418
360
58

(25.) 123)63125(513$\frac{26}{123}$
615
162
123
395
369
26

(26.) 216)1554768(7198
1512
427
216
2116
1944
1728
1728

(27.) 81)200204(2471$\frac{53}{81}$
162
382
324
580
567
134
81
53

(28.) 102)100000(980$\frac{40}{102}$
918
820
816
40

(29.) $1023)40060(39\frac{163}{1023}$
3069
9370
9207
163

(30.) $27)8317(308\frac{1}{27}$
81
217
216
1

(31.) 642)6421284(10002
642
1284
1284

(32.) $3102)120345(38\frac{2469}{3102}$
9306
27285
24816
2469

(33.) 1269)6346269(5001
6345
1269
1269

(Art. 64, p. 52.)

(36.) .67

(38.) $85\frac{761}{1000}$

(40.) $3\frac{3444}{10000}$

(Art. 65, p. 53.)

(43.) 7|0)2212|0
316

(44.) 9|00)8298|00
922

(45.) $19|00)402|20(21\frac{320}{1900}$
38
22
19
3

(46.) $16|00)1370|00(85\frac{1000}{1600}$
128
90
80
10

(47.) 5|00)899|52
$179\frac{452}{500}$

(48.) $12|000)131|127(10\frac{11127}{12000}$
12
11127

(49.) 306|000)4590|000(15
306
1530
1530

(50.) 1203|00)138345|00(115
1203
1804
1203
6015
6015

(51.) 4|00000)8|03402
$2\frac{3402}{400000}$

(52.) 89|0000)1157|9112(13$\frac{9112}{890000}$
89
267
267

(53.) 3261|00)36789|00(11$\frac{91800}{326100}$
3261
4179
3261
918

(Pages 53, 54.)

(4.) Ans. 109
(5.) 365
(8.) Ans. 21

(10.) 15|000)2653|062(176$\frac{13062}{15000}$
15
115
105
103
90
13

REVIEW EXERCISES.

(PAGES 54, 55.)

(2.) 3094)48288058(15607
3094
17348
15470
18780
18564
21658
21658

(4.) 540 — 512 = 28 × 8 = 224 Ans.

(5.) 160 × 80 = 12800; 220 × 65 = 14300; 12800 + 14300 = 27100 dolls., Ans.

(7.) 45 × 30 = 1350; 1350 — 800 = 550 dolls., Ans.

(9.) 105 × 15 = 1575; 5500 — 1575 = 3925; 3925 ÷ 157 = 25 shares, Ans.

(10.) 60 × 50 = 3000; 18050 — 3000 = 15050; 15050 ÷ 50 = 301 acres., Ans.

(11.) 50 × 5 = 250; 250 ÷ 2 = 125; 125 × 7 = 875; 875 + 250 = 1125 dolls., Ans.

(12.) 168 × 4 = 672; 672 + 35 = 707; 168 + 707 = 875; 875 × 3 = 2625; 2625 — 1200 = 1425: 168 + 707 + 1425 = 2300 acres., Ans.

REVIEW EXERCISES.

(PAGE 59.)

(2.) Ans. 917
(3.) 613
(4.) 3473
(6.) 64
(9.) 168465
(11.) 11231

(12.) 39792
692
23)39100(1700 Ans.
23
161
161

(13.) 115 × 5 = 575; 575 + 4 = 579, Ans
(14.) 579 — 4 = 575; 575 ÷ 5 = 115, Ans.

ARITHMETICAL ANALYSIS.

(Art. **75**, pp. **60–62.**)

(2.) 825 ÷ 11 = 75; 75 × 7 = 525, Ans.
(3.) 1560 ÷ 120 = 13; 13 × 139 = 1807, Ans.
(4.) 1807 ÷ 139 = 13; 13 × 120 = 1560, Ans.
(5.) 2440 ÷ 4 = 610; 610 × 9 = 5490 miles, Ans.
(7.) 21 × 13 = 273; 273 ÷ 39 = 7 days, Ans.
(8.) 57 × 2 = 114; 114 ÷ 19 = 6 dolls., Ans.
(9.) 30 × 90 = 2700; 2700 ÷ 540 = 5 dolls., Ans.
(11.) 3040 ÷ 19 = 160; 2240 ÷ 160 = 14 horses, Ans.
(12.) 1380 ÷ 23 = $60; 1980 ÷ 60 = 33 men, Ans.
(13.) 93 ÷ 31 = 3; 87 ÷ 3 = 29 horses, Ans.
(14.) 912 ÷ 16 = 57; 17670 ÷ 57 = 310 hhds., Ans.
(16.) 20 + 10 + 5 = 35; 11900 ÷ 35 = 340, Ans.
(17.) 60 + 80 = 140; 11200 ÷ 140 = 80 acres, Ans.
(18.) 175 + 90 = 265; 3445 ÷ 265 = 13; 90 × 13 = 1170 dollars received for colts; 175 × 13 = 2275 dollars received for horses.
(20.) 5963 — 321 = 5642; 5642 ÷ 2 = 2821, No. of B.'s votes; 2821 + 321 = 3142, No. of A.'s votes.
(21.) 1200 — 360 = 840; 840 ÷ 2 = 420, distance one traveled; 420 + 360 = 780, distance the other traveled.
(22 Samuel receives 50 dollars more than Edmund, then Ernest receives 150 dollars more than Samuel, or 200 dollars more than Edmund. 50 + 200 = 250; 1350 — 250 = 1100; 1100 ÷ 3 = $366\frac{2}{3}$ dollars, Edmund's share; $366\frac{2}{3}$ + 50 = $416\frac{2}{3}$ dollars, Samuel's share; $416\frac{2}{3}$ + 150 = $566\frac{2}{3}$ dollars, Ernest's share.

UNITED STATES MONEY.

(ART. 79, p. 65.)

(12.)	Ans. $73.11	(17.)	$1350.
(15.)	$109.09	(18.)	$500.875

(ART. 81, p. 66.)

(6.)	3100 cents.	(9.)	36030 mills.

(ART. 82, p. 67.)

(5.)	Ans. $1.62	(11.)	Ans. $18.734
(8.)	$36.03		

(ART. 83, p. 68.)

(3.)	Ans. $1785.22	(5.)	Ans. $12823.31

(ART. 84, p. 68.)

(3.)	Ans. $15.942

(ART. 85, p. 69.)

(4.)	Ans. $1850.22	(6.)	Ans. 276.75

(ART. 86, p. 70.)

(4.)	$20.125	(7.)	5.02\frac{162}{189}$

(9.) $954 = 95400 cts.; 95400 ÷ 25 = 3816, Ans.

(10.) $141 = 14100 cts.; 14100 ÷ 75 = 188, Ans.

(11.) $444 = 444000 mills; 444000 ÷ 370 = 1200, Ans.

(12.) $29 = 29000 mills; 29000 ÷ 7 = 4142$\frac{6}{7}$, Ans.

(13.) $370 = 370000 mills; .125 = 125 mills; 370000 ÷ 125 = 2960 Ans.

(14.) $10 × 13 = $130; $130 + $7 = $137; $137 = 13700 cents; 5 dimes = 50 cents; 13700 + 50 = 13750 cents; 13750 ÷ 125 = 110, Ans.

(PAGES 71, 72.)

(2.)	Ans. $691.25	(4.)	Ans. $791.25

(6.) $43 + $9.75 + $25 + $19.87 + $.15 = $97.77; $100 − $97.77 = $2.23, Ans.

(8.) 1501.50 ÷ 13.65 = 110 barrels, Ans.

(10.) Ans. $4.25

(11.) 1774.25 ÷ 47 = $37.75, Ans.

(13.) $260.50 × 316 = $82318, Ans.

(14.) $194.625 ÷ 519 = $.375, or 37½ cents, Ans.

(15.) $.27 × 65 = $17.55; $6.50 × 15 = $97.50; $17.55 + 97.50 = $115.05, Ans.

(16.) $3.25 — $.50 = $2.75 = 275 cts.; $825 = 82500 cts.; 82500 ÷ 275 = 300 days, Ans.

(17.) $25 = 2500 cts.; 2500 ÷ 200 = 12½ cts., Ans.

(18.) $.125 = 125 mills; $25 = 25000 mills; 25000 ÷ 125 = 200 lbs., Ans.

(19.) 312 pounds × 5 = 1560 pounds; $491.40 = 49140 cts.; 49140 cts. ÷ 1560 = $.315, Ans.

(20.) $.15 + $.12½ + $.25 = $.52½, or $.525; $.525 × 365 = $191.62½, Ans.

(Art. 88, p. 73.)

(2.) $235.25 — 37.50 = 198.75; $198.75 = 19875 cents; $1.75 = 175 cts.; 19875 ÷ 175 = 113 bushels, Ans.

(3.) $8 × 12 = $96; $6 × 17 = $102; $96 + 102 = $198; $200 — $198 = $2, Ans.

(4.) 25 cts. × 150 = 3750 cts.; 3750 ÷ 50 = 75 arithmetics, Ans.

(5.) $1.25 × 600 = $750.00; $750.00 ÷ 160 = $4.68¾, Ans.

(6.) $7.25 × 300 = $2175.00; 2175 — 1515 = $660.00; 660.00 ÷ 4.40 = 150 cords, Ans.

(7.) $.65 × 50 = $32.50; $.15 × 120 = $18.00; $32.50 — $18.00 = 14.50, Ans.

(8.) 32 cts. × 14 = 448 cts.; 448 ÷ 28 = 16 pounds, Ans.

(9.) $.30 × 475 = $142.50; $.50 × 76 = $38.00; $142.50 + $38.00 = $180.50; 180.50 ÷ 9.50 = 19 barrels, Ans.

(Art. 91, pp. 74, 75.)

(1.)
$.50 × 100 = $50.00
.14 × 150 = 21.00
.42 × 60 = 25.20
.60 × 132 = 79.20
12.50 × 10 = 125.00
Ans. $300.40

(2.)
$.63 × 210 = $132.30
1.50 × 500 = 750.00
.40 × 250 = 100.00
.60 × 150 = 90.00
9.50 × 50 = 475.00
Ans. $1547.30

(3.)
$4.25 × 25 = $106.25
4.25 × 30 = 127.50
1.25 × 20 = 25.00
7.50 × 3 = 22.50
10.00 × 15 = 150.00
Ans. $431.25

(Art. 94, p. 76.)

(2.) Baltimore, Nov. 16, 1866.

Mr. James McClintock,

To Andrew Saulsbury, *Dr.*

Oct.	1.	For 110 bushels of corn, at .75,	$82.50	
"	7.	" 3 bbls. of flour, at $7.50,	22.50	
Nov.	5.	" 62 bushels of oats, at .43,	26.66	
				$131.66

Cr.

Oct.	5.	By 6 M. extra shingles, at $6,	$36.00	
Nov.	1.	" Cash,	60.00	
"	10.	" Bill of labor,	8.66	
"	16.	" Due Bill,	27.00	
				$131.66

Received payment,

____________________for

Andrew Saulsbury.

(ART. 95, p. 77.)

2.	**Ans.** **$744.55**	4.	**Ans.** **$1727.80**
3.	**$970.05**		

FACTORING.

(ART. 115, p. 82.)

2.	**Ans.** $2^2, 3^2, 7$	7.	**Ans.** **13, 29, 37**
4.	3^2, 709	9.	**2, 3, 7, 11, 17**

(ART. 116, p. 83.)

13.	**Ans.** **3, 5**

(ART. 117, p. 84.)

3.	**Ans.** 190680	6.	**Ans.** **919350**

(ART. 118, p. 85.)

4.	Ans. 876	9.	**Ans.** **$192\frac{207}{700}$**
7.	$4611\frac{23}{63}$		

(ART. 119, p. 86.)

15.	**Ans.** **$1\frac{13}{50}$**

(PAGES 86, 87.)

(2.)

$$\frac{\overset{3}{\cancel{105}} \times 21}{\cancel{35}} = 63 \text{ pounds, Ans.}$$

(3.)

$$\frac{\overset{40}{\cancel{5}.6\cancel{0}} \times 2}{\cancel{14}} = 80 \text{ pounds, Ans.}$$

(4.)

$$\frac{\overset{\overset{3}{\cancel{9}}}{\cancel{162}} \times \overset{2}{\cancel{50}}}{\cancel{18} \times \underset{\cancel{3}}{\cancel{75}}} = 6 \text{ loads, } \textbf{Ans.}$$

(5.)

$$\frac{\overset{\overset{30}{\cancel{90}}}{\cancel{360}} \times \cancel{14}}{\cancel{3} \times \underset{\cancel{4}}{\cancel{56}}} = 30 \text{ cts. per pound, } \textbf{Ans.}$$

(6.)

$$\frac{\overset{3}{\cancel{150}} \times \overset{8}{\cancel{40}}}{\underset{\cancel{5}}{\cancel{250}}} = 24 \text{ days, Ans.}$$

(7.)

$$\frac{\overset{41}{\cancel{164}} \times \overset{3}{\cancel{9}}}{\underset{\cancel{4}}{\cancel{12}}} = 123 \text{ dictionaries, } \textbf{Ans.}$$

(8.)

$$\frac{\overset{\overset{45}{\cancel{135}}}{\cancel{40.50}}}{\cancel{30} \times \cancel{3}} = \$.45, \text{ Ans.}$$

(9.)

$$\frac{\overset{\overset{\cancel{3}}{\cancel{225}}}{\cancel{110.25}} \times \overset{\cancel{4}}{\cancel{80}}}{\cancel{49} \times \cancel{60} \times \underset{\cancel{3}}{\cancel{.75}}} = 4 \text{ bales, } \textbf{Ans.}$$

(Art. 122, p. 88.)

3. Ans. 33
6. 17
7. Ans. 10

(Art. 124, p. 89.)

10. Ans. 12

(Page 90.)

(1.) 356)788(2
712
76)356(4
304
52)76(1
52
24)52(2
48
4)24(6
24
Ans. 4 rods.

(2.) 15)18(1
15
3)15(5
15
3)21(7
21
Ans. 3 feet.

(3.) 375)450(1
375
75)375(5
375
75)525(7
525
Ans. 75 acres.

(4.) 720)1008(1
720
288)720(2
576
144)288(2
288
144)1152(8
1152
Ans. 144 bushels.

(5.)
679)5901(8
5432
469)679(1
469
210)469(2
420
49)210(4
196
14)49(3
42
7)14(2
14

7)6734
962

7 is the greatest Common Divisor; therefore $7 is the price per head; 679 ÷ 7 = 97 sheep, A could purchase; 5901 ÷ 7 = 843 sheep, B could purchase; 6734 ÷ 7 = 962 sheep, C could purchase.

(ART. **128**, p. **92.**)

3.	Ans. 252	6.	Ans. 12600

(ART. **129**, p. **93.**)

11.	Ans. 390	13.	Ans. 5250

(PAGE **93.**)

(1.) The least sum required must be the least common multiple of \$3, \$4, \$5, \$6.

$$\begin{array}{r|l} 3 & 3,\ 4,\ 5,\ 6 \\ \hline 2 & 1,\ 4,\ 5,\ 2 \\ \hline & 1,\ 2,\ 5,\ 1 \end{array}$$

$3 \times 2 \times 2 \times 5 = \$60$, Ans.

(2.)

$$\begin{array}{r|l} 2 & 10,\ 12,\ 8,\ 18 \\ \hline 2 & 5,\ 6,\ 4,\ 9 \\ \hline 3 & 5,\ 3,\ 2,\ 9 \\ \hline & 5,\ 1,\ 2,\ 3 \end{array}$$

$2 \times 2 \times 3 \times 5 \times 2 \times 3 =$ [360 minutes, Ans.

(3.)

$$\begin{array}{r|l} 6 & 12,\ 18,\ 30,\ 36 \\ \hline 2 & 2,\ 3,\ 5,\ 6 \\ \hline 3 & 1,\ 3,\ 5,\ 3 \\ \hline & 1,\ 1,\ 5,\ 1 \end{array}$$

$6 \times 2 \times 3 \times 5 = \$180$, smallest sum of money;

$180 \div 12 = 15$ men at \$12 per month;

$180 \div 18 = 10$ men at \$18 per month;

$180 \div 30 = 6$ men at \$30 per month;

$180 \div 36 = 5$ men at \$36 per month.

COMMON FRACTIONS.

(ART. **140**, p. **96.**)

16.	Ans. $\frac{17}{25}$	22.	Ans. $\frac{98}{300}$
17.	$\frac{2}{50}$	23.	$\frac{51}{640}$
18.	$\frac{11}{22}$	24.	$\frac{16}{1000}$
19.	$\frac{28}{31}$	25.	$\frac{167}{929}$
20.	$\frac{19}{62}$	26.	$\frac{72000}{21}$
21.	$\frac{1}{115}$		

(ART. **143**, p. **100.**)

2. Ans. $\frac{3}{4}$ | 10. Ans. $\frac{3}{4}$
5. $\frac{3}{5}$ | 13. $\frac{18}{25}$

(ART. **144**, p. **101.**)

2. Ans. $4\frac{1}{6}$ | 10. Ans. 130
5. 11 |

(ART. **145**, p. **101.**)

2 Ans. $\frac{22}{5}$ | 10. Ans. $\frac{3127}{43}$
6. $\frac{125}{9}$ |

(ART. **146**, p. **102.**)

15. Ans. $\frac{880}{9}$

(ART. **149**, p. **104.**)

7. Ans. $\frac{16}{20}, \frac{6}{20}, \frac{7}{20}$ | 11. Ans. $\frac{80}{120}, \frac{105}{120}, \frac{110}{120}, \frac{114}{120}$

(ART. **150**, p. **104.**)

14. Ans. $\frac{18}{42}, \frac{10}{42}, \frac{132}{42}, \frac{27}{42}$

(ART. **152**, p. **105.**)

7. Ans. $\frac{55}{42} = 1\frac{13}{42}$ | 11. Ans. $2\frac{2}{19}$

(ART. **153**, p. **106.**)

18. Ans. $5\frac{7}{10}$ | 21. Ans. $55\frac{3}{8}$

(ART. **155**, p. **107.**)

7. Ans. $\frac{32}{117}$ | 12. Ans. $\frac{18}{37}$
9. $\frac{1}{72}$ |

(PAGE **108.**)

(2.)
$\frac{1}{5} = \frac{16}{80}$
$\frac{3}{20} = \frac{12}{80}$
$\frac{16}{80} + \frac{12}{80} + \frac{9}{80} = \frac{37}{80}$, Ans.

(3.)
$6 + 8 + 9 = 23$
$\frac{3}{4} = \frac{6}{8}$, $\frac{1}{2} = \frac{4}{8}$
$\frac{6}{8} + \frac{5}{8} + \frac{4}{8} = \frac{15}{8} = 1\frac{7}{8}$
$23 + 1\frac{7}{8} = 24\frac{7}{8}$, Ans.

(4.) $9 + 4 = 13$

$\frac{2}{7} = \frac{22}{77}$ and $\frac{5}{11} = \frac{35}{77}$

$\frac{22}{77} + \frac{35}{77} = \frac{57}{77}$

$13 + \frac{57}{77} = 13\frac{57}{77}$ years, Ans.

(6.) $37\frac{5}{9} = 37\frac{65}{117}$

$8\frac{9}{13} = 8\frac{81}{117}$

Taking 1 from 37 leaves 36; the 1 taken reduced $= \frac{117}{117}$; $\frac{117}{117} + \frac{65}{117} = \frac{182}{117}$; $\frac{182}{117} - \frac{81}{117} = \frac{101}{117}$.

$36 - 8 = 28$, and $28 + \frac{101}{117} = 28\frac{101}{117}$, Ans.

(7.) $16\frac{1}{3} = \frac{98}{6}$, and $12\frac{1}{2} = \frac{75}{6}$

$\frac{98}{6} - \frac{75}{6} = \frac{23}{6} = 3\frac{5}{6}$ barrels, Ans.

(8.) $131\frac{7}{8} + 160\frac{9}{16} = 292\frac{7}{16}$

$292\frac{7}{16} = 292\frac{35}{80}$, and $150\frac{7}{20} = 150\frac{28}{80}$

$292\frac{35}{80} - 150\frac{28}{80} = 142\frac{7}{80}$, Ans.

(Art. 158, p. 109.)

5. Ans. $\frac{55}{61}$ | 10. Ans. 19

(Art. 159, p. 110.)

16. Ans. 162

(Art. 160, p. 111.)

6. Ans. 56 | 10. Ans. $6\frac{1}{4}$

(Art. 161, p. 111.)

14. Ans. $3298\frac{18}{25}$

(Art. 162, p. 112.)

5. Ans. $2\frac{5}{7}$

(Art. 164, p. 113.)

15. Ans. $19\frac{17}{27}$

(Page 113.)

(2.) $\$\frac{7}{8} \times 196 = \$\frac{1372}{8} = \$171\frac{1}{2}$, Ans.

(3.) $\$\frac{6}{10} = \$\frac{3}{5}$; $\$\frac{3}{5} \times 26 = \$\frac{78}{5} = \$15\frac{3}{5}$, Ans.

(5.) $\$7 \times \frac{15}{16} = \$\frac{105}{16} = \$6\frac{9}{16}$, Ans.

(8.) $2\frac{25}{36}$ yds. $\times\ 4 = 10\frac{7}{9}$ yds., Ans.

(9.) $\$16\frac{3}{4} = \$\frac{67}{4};\ \$\frac{67}{4} \times \frac{1}{4} = \$\frac{67}{16}$
$\$\frac{67}{16} \times \frac{8}{9} = \$\frac{67}{18} = \$3\frac{13}{18}$, Ans.

(10.)

$$\frac{5}{\cancel{16}} \text{ of } \frac{\overset{4}{\cancel{64}}}{1} \text{ acres} = 20 \text{ acres};$$

$$\frac{4}{\cancel{5}} \text{ of } \frac{\overset{4}{\cancel{20}}}{1} \text{ acres} = 16 \text{ acres, Ans.}$$

(ART. 166, p. 114.)

(5.) Ans. $\frac{2}{67}$ | (9.) Ans. $\frac{1}{218}$

(ART. 168, p. 116.)

(8.) Ans. $38\frac{2}{3}$ | (12.) Ans. $61\frac{1}{9}$

(ART. 169, p, 117.)

(6.) Ans. $1\frac{5}{27}$ | (11.) Ans. $1\frac{8}{60} = 1\frac{2}{15}$

(ART. 171, p. 118.)

(20.) Ans. $\frac{3}{70}$

(PAGE 119.)

(1.) $\$\frac{3}{4} \div 4 = \$\frac{3}{4} \times \frac{1}{4} = \$\frac{3}{16}$, Ans.

(2.)

$$1\frac{7}{8} = \frac{15}{8};\ \frac{15}{8} \div 5 = \frac{\overset{3}{\cancel{15}}}{8 \times \cancel{5}} = \frac{3}{8} \text{ Ans.}$$

(3.)

$$\$13\frac{3}{4} = \$\frac{55}{4};\ \$\frac{55}{4} \div 10 = \$\frac{\overset{11}{\cancel{55}}}{4 \times \underset{2}{\cancel{10}}} = \$1\frac{3}{8}, \text{ Ans.}$$

(4.) $\$250\frac{3}{8} = \$\frac{2003}{8}$; $\$\frac{2003}{8} \div 19 = \$\frac{2003}{8 \times 19} = \$\frac{2003}{152}$
[$= \$13\frac{27}{152}$, Ans.

(6.) $\$4\frac{3}{5} = \$\frac{23}{5}$; $\$\frac{23}{5} \div \frac{2}{3} = \$\frac{23 \times 3}{5 \times 2} = \$\frac{69}{10} = 6\frac{9}{10}$, Ans.

(7.) $104\frac{2}{5} = \frac{522}{5}$; $\$87 \div \frac{522}{5} = \$\frac{\cancel{87} \times 5}{\underset{6}{\cancel{522}}} = \$\frac{5}{6}$, Ans.

(9.) $\$9\frac{1}{2} = \$\frac{19}{2} = \$\frac{57}{6}$, and $\$3\frac{1}{6} = \$\frac{19}{6}$
$\frac{19}{6} \div \frac{57}{6} = \frac{19}{57} = \frac{1}{3}$, Ans.

(10.) $87 \div \frac{5}{6} = \frac{87 \times 6}{5} = \frac{522}{5} = 104\frac{2}{5}$, Ans.

(11.) $1806\frac{7}{8} = \frac{14455}{8}$, and
$17\frac{1}{2} = \frac{35}{2} = \frac{140}{8}$
$\frac{14455}{8} \div \frac{140}{8} = \frac{14455}{140} = 103\frac{1}{4}$ hours, Ans.

RELATION OF NUMBERS.

(Art. 174, p. 121.)

(11.) Ans. $\frac{21}{35} = \frac{3}{5}$

(Page 121.)

(1.) $\frac{45}{75} = \frac{3}{5}$, Ans.

(2.) $\frac{1\frac{1}{2}}{6} = \frac{1}{4}$, Ans.

(4.) $\frac{12\frac{1}{2}}{18\frac{3}{4}} = \frac{2}{3}$; $\frac{2}{3}$ of \$30 = \$20, Ans.

(5.) $\frac{35}{72}$ Ans.

(6.) $\frac{3}{8}$ of 320 = 120
120 + 40 = 160
$\frac{160}{320} = \frac{1}{2}$, Ans.

REVIEW EXERCISES.

(PAGES 122, 123.)

(1.) $\frac{3619}{6251}$

$$\frac{3619 \div 329}{6251 \div 329} = \frac{11}{19}, \text{ Ans.}$$

(2.) $\frac{51 \times 11}{61 \times 11} = \frac{561}{671}$, Ans.

(3.) $\frac{100 \times 199}{1 \times 199} = \frac{19900}{199}$; $\frac{19900}{199} + \frac{100}{199} = \frac{20000}{199}$, Ans.

(4.)

$$\left.\begin{aligned} \tfrac{2}{3} &= \tfrac{20}{30} \\ \tfrac{4}{5} &= \tfrac{24}{30} \\ \tfrac{5}{6} &= \tfrac{25}{30} \\ \tfrac{3}{10} &= \tfrac{9}{30} \end{aligned}\right\} \text{Ans.}$$

(5.) $19\frac{9}{10} = \frac{199}{10} = \frac{1194}{60}$

$51\frac{5}{6} = \frac{311}{6} = \frac{3110}{60}$

$63\frac{3}{4} = \frac{255}{4} = \frac{3825}{60}$

$\frac{1194}{60} + \frac{3110}{60} = \frac{4304}{60}$; $\frac{4304}{60} - \frac{3825}{60} = \frac{479}{60} = \$7\frac{59}{60}$, Ans.

(6.) Joseph has $\$13\frac{3}{20}$;

$$\left.\begin{aligned} &\text{Andrew has } \$13\tfrac{3}{20} + \$7\tfrac{3}{5} = \$20\tfrac{3}{4}; \\ &\text{Henry has } \$13\tfrac{3}{20} + \$20\tfrac{3}{4} = \$33\tfrac{9}{10} \end{aligned}\right\} \text{Ans.}$$

(7.) $\frac{5}{8} - \frac{2}{5} = \frac{25}{40} - \frac{16}{40} = \frac{9}{40}$, Ans.

(8.) $\frac{2}{3}$ of $\frac{11}{16} = \frac{\cancel{2} \times 11}{3 \times \underset{8}{\cancel{16}}} = \frac{11}{24}$, Ans.

(9.) $12\frac{1}{10} = \frac{121}{10}$

$3\frac{2}{3} = \frac{11}{3}$

$$\frac{121}{10} \div \frac{11}{3} = \frac{\overset{11}{\cancel{121}} \times 3}{10 \times \cancel{11}} = \frac{33}{10} = 3\frac{3}{10}, \text{ Ans.}$$

(10.) $\frac{7}{3}$ of $\frac{1}{3}$ of $2 = \frac{14}{9}$, and
$\frac{1}{3}$ of $\frac{9}{11}$ of $\frac{8}{3} = \frac{8}{11}$

$$\frac{14}{9} \div \frac{8}{11} = \frac{\overset{7}{\cancel{14}} \times 11}{9 \times \underset{4}{\cancel{8}}} = \frac{77}{36} = 2\tfrac{5}{36}, \text{ Ans.}$$

(11.) $\frac{1}{5}$ of \$3240 = \$648
$\frac{4}{5}$ = \$648 × 4 = \$2592
\$2592 — \$500 = \$2092, Ans.

(12.) In as many weeks as $\frac{2}{3}$ is found times in $31\frac{1}{2}$:
$31\frac{1}{2} = \frac{63}{2}$;

$$\frac{63}{2} \div \frac{2}{3} = \frac{63 \times 3}{2 \times 2} = \frac{189}{4} = 47\tfrac{1}{4} \text{ weeks, Ans.}$$

(13.)
$$\frac{3}{4} \text{ of } \frac{5}{6} = \frac{\cancel{3} \times 5}{4 \times \underset{2}{\cancel{6}}} = \frac{5}{8}$$

$\frac{5}{6} \times \frac{5}{8} = \frac{25}{48}$, Ans.

(14.)
$$\frac{\frac{3}{4}}{\frac{6}{\cancel{5}} \times \frac{\cancel{5}}{7}} = \frac{\frac{3}{4}}{\frac{6}{7}} = \frac{\cancel{3} \times 7}{4 \times \underset{2}{\cancel{6}}} = \frac{7}{8}$$

$$3\tfrac{7}{8} = \frac{31}{8};\ \frac{31}{8} \div \frac{9}{10} = \frac{31 \times \overset{5}{\cancel{10}}}{\underset{4}{\cancel{8}} \times 9} = \frac{155}{36}$$

$1\frac{3}{16} = \frac{19}{16}$; $\left(\frac{7}{8} + \frac{155}{36}\right) - \frac{19}{16} =$
$\left(\frac{126}{144} + \frac{620}{144}\right) - \frac{171}{144} = \frac{575}{144} = 3\frac{143}{144}$, Ans.

(15.)
$$\frac{2+3}{3+3} = \frac{5}{6}, \text{ and}$$

$\frac{2}{3} = \frac{4}{6}$; $\frac{5}{6} - \frac{4}{6} = \frac{1}{6}$ increased, Ans.

(16.) $\frac{3+3}{2+3} = \frac{6}{5} = \frac{12}{10}$; and $\frac{3}{2} = \frac{15}{10}$
$\frac{15}{10} - \frac{12}{10} = \frac{3}{10}$ diminished, Ans.

(17.) $100 \div \frac{17}{19} = \frac{100 \times 19}{17} = \frac{1900}{17} = 111\frac{13}{17}$, Ans.

(18.) If I pay away $\frac{1}{2}$, one-half will remain. If I then pay away $\frac{1}{3}$ of the remaining half, $\frac{2}{3}$ of $\frac{1}{2}$ will remain $= \frac{1}{3}$. If I then pay away $\frac{1}{4}$ of $\frac{1}{3}$, $\frac{3}{4}$ of $\frac{1}{3}$ will remain $= \frac{1}{4}$, Ans.

(19.) $120 - 30 = 90$
$\frac{1}{9}$ of $90 = 10$
$90 - 10 = 80$ remaining, and
80 is $\frac{80}{120}$ or $\frac{2}{3}$ of the original number.

(20.) $\frac{1}{8}$ of $1\frac{12}{31} = \frac{1}{8}$ of $\frac{43}{31} = \frac{43}{248}$, Ans.

(21.) $8\frac{3}{8} = \frac{67}{8}$, and $41\frac{7}{8} = \frac{335}{8}$
$\frac{335}{8} \div \frac{67}{8} = \frac{335}{67} = 5$ tons, Ans.

(22.) $31\frac{4}{5} \times 4 = 127\frac{1}{5}$
100 gallons $= \frac{100}{127\frac{1}{5}} =$
$\frac{500}{636} = \frac{125}{159}$ of the whole, Ans.

(23.) $\frac{9}{15} = \frac{3}{5} = \frac{24}{40}$
$\frac{24}{40} \div \frac{3}{40} = 8$, Ans.

EXERCISES IN ANALYSIS.

(PAGES 124–126.)

(2.) $\$210 \div 20 = \$10\frac{1}{2}$
$\$10\frac{1}{2} \times 27 = \$283\frac{1}{2}$, Ans.

(3.) $\$283\frac{1}{2} \div 27 = \$10\frac{1}{2}$; $\$10\frac{1}{2} \times 20 = \$210$, Ans.

(5.) $\frac{1}{4}$ of a pound will cost $\frac{1}{3}$ of \$.60 = \$.20
$\frac{4}{4}$, or 1 pound, will cost \$.20 × 4 = \$.80; and $553\frac{1}{4}$ will cost
\$.80 × $553\frac{1}{4}$ = \$442.60, Ans.

(6.) $\frac{1}{8}$ acre will cost $\frac{1}{3}$ of \$.75 = \$25
$\frac{8}{8}$, or 1 acre, will cost \$25 × 8 = \$200; and
$7\frac{4}{5}$ acres will cost \$200 × $7\frac{4}{5}$ = \$1560, Ans.

(7.) \$1560 ÷ $7\frac{4}{5}$ = \$200
$\frac{3}{8}$ of \$200 = \$75, Ans.

(9.) \$1 will buy $\frac{1}{7}$ of $5\frac{3}{8}$ =
$\frac{1}{7}$ of $\frac{43}{8}$ = $\frac{43}{56}$ bushels
\$15 will buy 15 times $\frac{43}{56}$ = $11\frac{29}{56}$ bushels, Ans.

(10.) $\frac{1}{9}$ of a ton will cost $\frac{1}{7}$ of \$5.60 = \$.80
$\frac{9}{9}$, or 1 ton, will cost \$.80 × 9 = \$7.20
540 ÷ 720 = $\frac{3}{4}$, Ans.

(11.) \$$11\frac{1}{2} \div 19\frac{1}{2}$ = \$$\frac{23}{39}$
$2\frac{7}{8} \div \frac{23}{39} = \frac{23}{8} \div \frac{23}{39} = 4\frac{7}{8}$,

(12.) $33\frac{11}{12} \div 4\frac{5}{8} = \frac{407}{12} \div \frac{37}{8} = \frac{\overset{11}{\cancel{407}} \times \overset{2}{\cancel{8}}}{\underset{3}{\cancel{12}} \times \cancel{37}} = \frac{22}{3} = 7\frac{1}{3}$

\$$27\frac{1}{2}$ ÷ \$$7\frac{1}{3} = \frac{55}{2} \div \frac{22}{3} = \frac{55 \times 3}{2 \times 22} = \frac{165}{44} = 3\frac{3}{4}$, Ans.

(13.) $4\frac{2}{5} = \frac{22}{5}$; $\frac{22}{5} \div 11 = \frac{2}{5}$, and
$7\frac{1}{5} = \frac{36}{5}$; $\frac{36}{5} \div \frac{2}{5} = 18$, Ans.

(15.) The man can do $\frac{1}{13}$ in one day, the boy $\frac{1}{10}$ in one day, and $\frac{1}{13} + \frac{1}{10} = \frac{10}{130} + \frac{13}{130} = \frac{23}{130}$ what both can do in 1 day. It will then take as many days to do $\frac{130}{130}$, or the whole, as $\frac{23}{130}$ is found times in $\frac{130}{130}$ = $5\frac{15}{23}$ days, Ans.

(16.) $\frac{1}{10} + \frac{1}{15} = \frac{3}{30} + \frac{2}{30} = \frac{5}{30} = \frac{1}{6}$
$\frac{6}{6} \div \frac{1}{6} =$ 6 days, Ans.

(17.) The first will fill $\frac{1}{10}$ of it in one hour, the second $\frac{1}{15}$, and the third $\frac{1}{16}$
$\frac{1}{10} + \frac{1}{15} + \frac{1}{16} = \frac{24}{240} + \frac{16}{240} + \frac{15}{240} = \frac{55}{240}$; $\frac{240}{240} \div \frac{55}{240} = 4\frac{4}{11}$ hours, Ans.

(19.) $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$; $\frac{6}{6} - \frac{5}{6} = \frac{1}{6}$ remaining, therefore
$400 = $\frac{1}{6}$, and $\frac{6}{6}$, or the whole, = 6 times $400, or $2400
$2400 — $400 = $2000, Ans.

(20.) $\frac{3}{8} + \frac{5}{12} = \frac{9}{24} + \frac{10}{24} = \frac{19}{24}$
$\frac{24}{24} - \frac{19}{24} = \frac{5}{24}$, therefore, $75 = \frac{5}{24}$; $\frac{1}{24} = \frac{1}{5}$ of $75 = 15$;
$\frac{24}{24} =$ 24 times 15 = 360, whole number of sheep.
$\frac{3}{8}$ of 360 = 135 in 1st pasture.
$\frac{5}{12}$ of 360 = 150 in 2d pasture.

(21.) $\frac{2}{9} + \frac{2}{7} = \frac{14}{63} + \frac{18}{63} = \frac{32}{63}$
$\frac{63}{63} - \frac{32}{63} = \frac{31}{63}$; therefore, $2000 = $\frac{31}{63}$ of the cost of the mill, and $\frac{1}{63}$ of the cost = $2000 ÷ 31 = 64\frac{16}{31}$; then $\frac{63}{63}$, or the whole cost, = 63 times 64\frac{16}{31}$ = 4064\frac{16}{31}$; then $\frac{2}{9}$ of 4064\frac{16}{31}$ = 903\frac{7}{31}$ is the sum A pays, and $\frac{2}{7}$ of 4064\frac{16}{31}$ = 1161\frac{9}{31}$ is the sum B pays.

(23.) If $\frac{3}{8}$ of the larger = $\frac{1}{2}$ the smaller,
$\frac{1}{8}$ of the larger = $\frac{1}{3}$ of $\frac{1}{2}$ of the smaller = $\frac{1}{6}$, and $\frac{8}{8}$ = 8 times $\frac{1}{6} = \frac{8}{6}$ of the smaller;
since $\frac{6}{6}$ = the smaller, $\frac{8}{6} + \frac{6}{6} = \frac{14}{6} = \frac{7}{3}$ of the smaller:
$\frac{1}{7}$ of 350 = 50; then $\frac{3}{3}$, or the whole of the smaller, $50 \times 3 = 150$; 350 — 150 = 200 the larger;
or, if $\frac{1}{3} = 50$, $\frac{4}{3}$, or the larger = 4 times 50 = 200, Ans.

(24.) Since the carriage is worth $2\frac{1}{2}$ times the horse, both together are worth $3\frac{1}{2} = \frac{7}{2}$ times the horse.

If $420 is $\frac{7}{2}$ times the worth of the horse, $\frac{1}{7}$ of $420 = $60 is $\frac{1}{2}$ the worth of the horse, and $60 × 2 = $120 must be $\frac{2}{2}$ times, or his entire worth.

If both the carriage and horse together are worth $420, and the horse be worth $120, the carriage must be worth $420 — $120 = $300, Ans.

(25.) Since the cost of the chaise is $\frac{1}{2}$ as much as the horse, the cost of both is $1\frac{1}{2} = \frac{3}{2}$ times the cost of the horse.

Since the cost of the harness is $\frac{1}{3}$ as much as the chaise and horse, it is $\frac{1}{3}$ of $\frac{3}{2} = \frac{1}{2}$ times the cost of the horse.

Then the cost of the three, $300, is $\frac{3}{2} + \frac{1}{2} = \frac{4}{2} = 2$ times the cost of the horse, and $\frac{1}{2}$ of $300 = $150 must be the cost of the horse.

Since the cost of the chaise is $\frac{1}{2}$ as much as that of the horse, it must be $\frac{1}{2}$ of $150 = $75.

Since the cost of the harness is $\frac{1}{3}$ as much as the chaise and horse both, it must be $\frac{1}{3}$ of $75 + $150 = $75, Ans.

DECIMAL FRACTIONS.

(Art. **185**, pp. **131, 132.**)

2. Ans. .005, .310 | 5. Ans. .1300, .1780, .3367

(Art. **186**, p. **132.**)

12. Ans. $\frac{22\frac{7}{9}}{1000} = \frac{205}{9000} = \frac{41}{1800}$

(Art. 187, p. 133.)

9. Ans. .275

(Art. 190, p. 135.)

5. Ans. 1072.43845

(Art. 191, p. 136.)

5. Ans. 106.9993

(Art. 194, pp. 137, 138.)

8.	Ans. 4312.5	12.	Ans. 60000.
10.	1.5	15.	.00039765

(Art. 195, pp. 139, 140.)

7.	Ans. 34.5	16.	Ans. 182900.
8.	345.	18.	290.
13.	9.875	20.	25.
14.	.9875		

(Pages 140, 141.)

(1.) 197.025 + 211 + 163.175 + 150.65 = 721.85 miles, Ans.

(2.) \$7691.55 + \$1006.45 = \$8698, Ans.

(3.)
$$\begin{array}{r} 640.000 \\ \underline{221.125} \\ 418.875 \end{array}$$ acres, Ans.

(4.) 17.75 × 4.54 = \$80.585, Ans.

(5.) 1.236 lbs. × 13 = 16.068 lbs., Ans.

(6.)
$$\begin{array}{r} 19.95 \\ \underline{20} \\ \$399.00 \end{array}$$, Ans.

(7.) 14.5 + .5 = 15.
14.5 — .5 = 14
Therefore $\frac{15}{14}$ = Ans.

(8.)

$$\begin{array}{r}
365.25 \\
365.242264 \\
\hline
.007736 \\
400 \\
\hline
3.094400 \text{ days, Ans.}
\end{array}$$

(9.)

$$\begin{array}{r}
75.8)2274.0(30 \\
2274 \\
\hline
0
\end{array}$$

$31.50 — $30 = $1.50, Ans.

(10.)

$$\begin{array}{r}
39.3685)63360.0000(1609 + \text{ Ans.} \\
393685 \\
\hline
2399150 \\
2362110 \\
\hline
3704000 \\
3543165 \\
\hline
160835
\end{array}$$

(11.)

$$\begin{array}{r}
.375 \\
.25 \\
\hline
.625
\end{array}
\quad = \quad
\begin{array}{r}
1.000 \\
.625 \\
\hline
.375
\end{array}$$

$$\begin{array}{r}
.375)1500.000(4000, \text{ Ans.} \\
1500 \\
\hline
0000
\end{array}$$

(12.)

$$\begin{array}{r}
65|0)487|5(7.50 \\
455 \\
\hline
325 \\
325 \\
\hline
\end{array}
\qquad
\begin{array}{r}
\$8.25 \\
7.50 \\
\hline
.75, \text{ Ans.}
\end{array}$$

(13.)

$$\begin{array}{r}
\$6400 \\
.875 \\
\hline
32000 \\
44800 \\
51200 \\
\hline
\$5600.000, \text{ Ans.}
\end{array}$$

(14.) $\frac{5600}{6400} = \frac{7}{8} = .875$, Ans.

(15.)

$$\begin{array}{r}
.9)\underline{6.66} \\
7.4
\end{array}
\qquad
\begin{array}{r}
60.5 \\
7.4 \\
\hline
2420 \\
4235 \\
\hline
\$447.70, \text{ Ans.}
\end{array}$$

(16.)
.60
.75
1.35)128.925(95.5 bushels of each kind.
1215
742
675
675
675

95.5 × .60 = $57.300 paid for the corn.
95.5 × .75 = $71.625 paid for the barley.

(Pages **142, 143.**)

(2.)
8.20
25
4100
1640
$205. Ans.

(3.)
56.70
1.20
1134
567
$68.04 Ans.

(4.)
9.60
12.5
4800
1920
960
$120. Ans.

(6.)
31.684
6.50
158420
190104
$205.94600, Ans

(7.)
53.725
1.14
214900
53725
53725
$61.24650, Ans.

(8.)
36.500
40
\$1460.000

5.680
50
\$284.000

16
5.25
80
32
80
\$84.00
284.00
1460.00
\$1828.00, Ans.

(10.)
2)2.560
1.28
21
128
256
\$26.88, Ans.

(11.)
2)3.248
1.624
9.5
8120
14616
\$15.428, Ans

(12.)
2)96.880
48.44
2.5
24220
9688
\$121.100, Ans.

(14.) Since the cost of the one is to that of the other as 5 to 7, if the cost of both together be divided into 5 + 7, or 12 equal parts, 5 of the parts, or $\frac{5}{12}$ will be the cost of the one; and 7 of the parts, or $\frac{7}{12}$ will be the cost of the other. Then,

$$\left.\begin{array}{l}\frac{5}{12}\text{ reduced to hundredths} = .41\frac{2}{3}\\ \frac{7}{12}\text{ reduced to hundredths} = .58\frac{1}{3}\end{array}\right\}\text{Ans.}$$

(15.) $1 + 2 + 5 = 8$

$$\left.\begin{array}{l}\text{1st man has } \frac{1}{8} = .12\frac{1}{2}\\ \text{2d `` `` } \frac{2}{8} = .25\\ \text{3d `` `` } \frac{5}{8} = .62\frac{1}{2}\end{array}\right\}\text{Ans.}$$

(17.)

$$.35 + .65 = 1.00$$

$$398.60 \div 100 = 3.986$$

$$\left.\begin{array}{l} 3.986 \times 35 = 139.51 \\ 3.986 \times 65 = 259.09 \end{array}\right\} \text{Ans.}$$

(18.)

$$13 + 12 = 25$$

$$\left.\begin{array}{l} \frac{13}{25} \text{ of } 475 = 247 \text{ boys} \\ \frac{12}{25} \text{ of } 475 = 228 \text{ girls} \end{array}\right\} \text{Ans.}$$

(19.)

$$.76 + .14 + .10 = 1.00$$

.76 of 2000 = 1520 lbs. nitre

.14 of 2000 = 280 lbs. charcoal

.10 of 2000 = 200 lbs. sulphur.

DECIMAL WEIGHTS AND MEASURES.

(Art. **241**, p. **161**.)

(2.) .4047 × 150 = 60.705 hectares, Ans.

(3.)

$$\begin{array}{r} 2.837 \\ 2.5 \\ \hline 14185 \\ 5674 \\ \hline 7.0925 \end{array}$$

7.0925, Ans.

(4.)

$$\begin{array}{r} 3.625 \\ 15 \\ \hline 18125 \\ 3625 \\ \hline 54.375 \end{array}$$

54.375 steres, Ans.

(5.)

$$\begin{array}{r} 2.2046 \\ 16.25 \\ \hline 110230 \\ 44092 \\ 132276 \\ 22046 \\ \hline 35.824750 \end{array}$$

35.824750 av. lbs., Ans

(6.) .9071 × 100 = 90.71 [tonneaux, Ans

(ART. **242**, p. **161**.)

(2.) 1 × .9465 = $.9465, Ans.

(3.) .4047 × 10 = 4.047 hectoliter, Ans.

(4.) 2.471 × 45 = 111.195 bushels, Ans.

DENOMINATE NUMBERS.

(ART. **245**, p. **163**.)

(2.)

$$\begin{array}{ll} \text{tons.} & \text{cwt.} \\ 3 & 15 \\ 20 & \\ \hline 60 & \\ 15 & \\ \hline 75 & \\ 100 & \\ \hline 7500 \text{ lb., Ans.} & \end{array}$$

(3.)

$$\begin{array}{ll} \text{lb.} & \text{oz.} \\ 2 & 8 \\ 16 & \\ \hline 32 & \\ 8 & \\ \hline 40 & \\ 16 & \\ \hline 240 & \\ 40 & \\ \hline 640 \text{ drams, Ans.} & \end{array}$$

(4.)

$$\begin{array}{l} \text{miles.} \\ 9 \\ 8 \\ \hline 72 \\ 40 \\ \hline 2880 \text{ rd., Ans.} \end{array}$$

(5.)

$$\begin{array}{lll} \text{gal.} & \text{qt.} & \text{pt.} \\ 98 & 0 & 1 \\ 4 & & \\ \hline 392 & & \\ 2 & & \\ \hline 785 \text{ pints, Ans.} & & \end{array}$$

(6.)

$$\begin{array}{ll} \text{A.} & \text{sq. rd.} \\ 583 & 130 \\ 160 & \\ \hline 3498 & \\ 583 & \\ \hline 93280 & \\ 130 & \\ \hline 93410 \text{ sq. rd., Ans.} & \end{array}$$

cords.
.) 17
128
136
34
17
2176
1728
17408
4352
15232
2176
3760128 cu. in., Ans.

bu. pk.
.) 27 3
4
108
3
111
8
888
2
1776 pints, Ans.

.) 5° 6′ 15″
60
300
6
306
60
18360
15
18375″, Ans.

fur. rd. yd. ft.
(10.) 5 12 4 0
40
200
12
212
5½
1060
106
1166
4
1170
3
3510 ft., Ans.

d. h. m. sec.
(11.) 365 5 48 50
24
1465
730
8765
60
525948
60
31556930 sec., Ans.

hhd. gal. qt. pt.
(12.) 24 18 2 0
63
72
144
18
1530
4
6122
2
12244 pt., Ans.

	m.	fur.	rd.	yd.	ft.	in.
(13.)	17	6	22	4	2	7

8
142
40
5702
$5\frac{1}{2}$
28510
2851
31361
4
31365
3
94097
12
188194
94097
1129164
7
1129171 in., Ans.

	bu.	pk.	qt.
(14.)	75	3	5

4
303
8
2429 qt., Ans.

	cwt.	lb.	oz.	dr.
(15.)	4	99	10	12

100
499
16
2994
499
7984
10
7994
16
47964
7994
12
127916 dr., Ans.

(16.) 180°
60
10800
60
648000 sec., Ans.

(Art. **246**, pp. **163, 164.**)

(18.) $\frac{7}{16} \times 160 = 70$ sq. rd., Ans.
(19.) $\frac{3}{8} \times 4 = 1\frac{1}{2}$ quarters, Ans.
(20.) $9\frac{2}{3} = \frac{29}{3}$; $\frac{29}{3} \times \frac{24}{1} \times \frac{60}{1} = 13920$ minutes, Ans.
(21.) $\frac{7}{1920} \times 12 \times 20 = \frac{7}{8}$ pwt., Ans.

(22.) $\frac{3}{350} \times \frac{100}{1} = \frac{6}{7}$ lb., Ans.

(24.) .0003 × 7 = .0021 days,
.0021 × 24 = .0504 hours,
.0504 × 60 = 3.024 minutes, Ans.

(25.) 6.35 × 8 = 50.8 fur.
50.8 × 40 = 2032 rd.
2032 × $5\frac{1}{2}$ = 11176 yd.
11176 × 3 = 33528 ft., Ans.

(26.) .1756 × 1000 = 175.6 meters, Ans.

(27.) .0015 × 63 = .0945 gal.
.0945 × 4 = .378 pt., Ans.

(28.) $15.69 × 100 = 1569 cts.
1569 × 10 = 15690 mills, Ans.

(29.) 3.675 × 1000 = 3675 kilograms, Ans.

(30.) .94375 × 160 = 151 sq. rd., Ans.

(Art. **247**, pp. **165**, **166**.)

(2.) 1|00)75|00
2|0)7|5 cwt.
3, 15 cwt. remaining.
3 tons 15 cwt., Ans.

(3.) 16)640 drams,
16)40
2, 8 oz.
2 lb. 8 oz., Ans.

(4.) 4|0)288|0
8)72
9 miles, Ans.

(5.) 2)785
4)392, 1 pt.
98
98 gals. 0 qt. 1 pt., Ans.

(6.) 16|0)9341|0(583 A.
80
134
128
61
48
130 sq. rd.
583 acres, 130 sq. rd., Ans.

(7.) 3760128 ÷ 1728 = 2176 ft.
2176 ÷ 128 = 17 cords, Ans.

(8.) 1776 ÷ 2 = 888 qt.
888 ÷ 8 = 111 pk.
111 ÷ 4 = 27 bu. 3 pk., Ans.

(9.) 18375 ÷ 60 = 306′ 15″
306 ÷ 60 = 5° 6′
5° 6′ 15″, Ans.

(11.) 6|0)3155693|0
6|0)52594|8, 50 sec.
24)8765, 48 min.
365, 5 h.
365 d. 5 h. 48 min. 50 sec., Ans.

(12.) 2)12244
4)6122
63)1530, 2 qt.
24, 18 gal.
24 hhds. 18 gal. 2 qt., Ans.

(13.) 12)1129171
3)94097, 7 in.
5½)31365, 2 ft.
2) 2
11)62730
4|0)570|2, $\frac{8}{2}$ = 4 yd.
8)142, 22 rd.
17, 6 fur.
17 m. 6 fur. 22 rd. 4 yd. 2 ft.
7 in., Ans

(14.) 8)2429
4)303, 5 qt.
75 bush. 3 pk. 5 qt., Ans.

(15.) 127916 ÷ 16 = 7994 and 12 dr. rem.
7994 ÷ 16 = 499 and 10 oz. rem.
499 ÷ 100 = 4 and 99 lb. rem.
4 cwt. 99 lb. 10 oz. 12 dr., Ans.

(16.) 648000 ÷ 60 = 10800
10800 ÷ 60 = 180 deg., Ans.

(18.) 70 ÷ 160 = $\frac{70}{160}$ = $\frac{7}{16}$ acre, Ans.

(19.) $1\frac{1}{2} = \frac{3}{2} \div 4 = \frac{3}{8}$ yd., Ans.

(20.) $13920 \div 60 = 232$ hours.
$232 \div 24 = 9$ days, 16 hours.
9 days, 16 hours $= 9\frac{2}{3}$ days, Ans.

(21.) $\frac{7}{8} \div 20 = \frac{7}{160}$
$\frac{7}{160} \div 12 = \frac{7}{1920}$ lb., Ans.

(22.) $\frac{6}{7} \div 100 = \frac{6}{700} = \frac{3}{350}$, Ans.

(24.) $3.024 \div 60 = .0504$ hours,
$.0504 \div 24 = .0021$ days,
$.0021 \div 7 = .0003$ weeks, Ans.

(25.) $33528 \div 3 = 11176$ yd.
$11176 \div 5\frac{1}{2} = 2032$ rd.
$2032 \div 40 = 50.8$ fur.
$50.8 \div 8 = 6.35$ miles, Ans.

(26.) $175.6 \div .1756$ kilos., Ans.

(27.) $.378 \div 4 = .0945$ qt.
$.0945 \div 63 = .0015$ hhd., Ans.

(28.) $15690 \div 10 = 1569$ cts.
$1569 \div 100 = \$15.69$, Ans.

(29.) $3675 \div 1000 = 3.675$ tons, Ans.

(30.) $151 \div 160 = \frac{151}{160}$, reduced to a decimal
$= .94375$ sq. acre, Ans.

(Art. 248, p. 167.)

(2.)

$\frac{8}{9} \times 40 = \frac{320}{9} = 35\frac{5}{9}$ rd.
$\frac{5}{9} \times \frac{11}{2} = \frac{55}{18} = 3\frac{1}{18}$ yd.
$\frac{1}{18} \times \frac{3}{1} = 0\frac{1}{6}$ ft.
$\frac{1}{6} \times 12 = 2$ in.
35 rd. 3 yd. 0 ft. 2 in., Ans.

(3.)

$\frac{1}{96} \times 63 = \frac{63}{96} = \frac{21}{32}$ gal.
$\frac{21}{32} \times 4 = \frac{21}{8} = 2\frac{5}{8}$ qt.
$\frac{5}{8} \times 2 = \frac{5}{4} = 1\frac{1}{4}$ pt.
$\frac{1}{4} \times 4 = 1$ gill.
2 qt. 1 pt. 1 gill, Ans

(4.)

$\frac{19}{42} \times 7 = \frac{19}{6} = 3\frac{1}{6}$ days

$\frac{1}{6} + 24 = 4$ hours

3 days, 4 hours, Ans.

(5.)

$\frac{5}{14} \times 60 = \frac{300}{14} = 21\frac{3}{7}'$

$\frac{3}{7} \times 60 = \frac{180}{7} = 25\frac{5}{7}''$

$21'$, $25\frac{5}{7}''$, Ans.

(6.)

$\frac{17}{24} \times 4 = \frac{17}{6} = 2\frac{5}{6}$ qr.

$\frac{5}{6} \times 25 = \frac{125}{6} = 20\frac{5}{6}$ lb.

$\frac{5}{6} \times 16 = \frac{80}{6} = 13\frac{1}{3}$ oz.

$\frac{1}{3} \times 16 = \frac{16}{3} = 5\frac{1}{3}$ dr.

2 qr. 20 lb. 13 oz. $5\frac{1}{3}$ dr., Ans.

(8.)

$.875 \times 63 = 55.125$ gal.

$.125 \times 4 = .5$ qt.

$.5 \times 2 = 1$ pt.

55 gal. 0 qt. 1 pt., Ans.

(9.)

$.4765625 \times 8 = 3.8125$ fur.

$.8125 \times 40 = 32.5$ rd.

$.5 \times 16\frac{1}{2} = 8.25$ ft.

$.25 \times 12 = 3$ in.

3 fur. 32 rd. 8 ft. 3 in., Ans.

(10.)

$.09375 \times 160 = 15$ sq. rd., [Ans.

(11.)

$.141 \times 20 = 2.82$ cwt.

$.82 \times 4 = 3.28$ qr.

$.28 \times 25 = 7$ lb.

5 tons, 2 cwt. 3 qr. 7 lb., Ans.

(12.)

$.761 \times 24 = 18.264$ h.

$.264 \times 60 = 15.84$ min.

$.84 \times 60 = 50.4$ sec.

18 h. 15 min. 50.4 sec., Ans

(Art. **249**, pp. **168**, **169**.)

(2.) 2 in. $\frac{2}{36} = \frac{1}{18}$ of a yard

$$3\frac{1}{18} = \frac{55}{18} \div 5\frac{1}{2} = \frac{\overset{5}{\cancel{55}} \times \cancel{2}}{\underset{9}{\cancel{18}} \times \cancel{11}} = \frac{5}{9} \text{ rd.}$$

$35\frac{5}{9} = \frac{320}{9} \div 40 = \frac{8}{9}$ fur., Ans.

(3.) 1 gill $= \frac{1}{4}$ pt.

$1\frac{1}{4}$ pt. $= \frac{5}{4}$; $\frac{5}{4} \div 2 = \frac{5}{8}$ qt.

$2\frac{5}{8}$ qt. $= \frac{21}{8}$; $\frac{21}{8} \div 4 = \frac{21}{32}$ gal.

$\frac{21}{32} \div 63 = \frac{1}{96}$ hhd., Ans.

(4.) 4 h. $= \frac{4}{24} = \frac{1}{6}$ day,
$3\frac{1}{6} = \frac{19}{6}$; $\frac{19}{6} \div 7 = \frac{19}{42}$ week, Ans.

(5.) $25\frac{5}{7} = \dfrac{25\frac{5}{7}}{60} = \frac{180}{420} = \frac{3}{7}$ minute,
$21\frac{3}{7} = \frac{150}{7}$; $\frac{150}{7} \div 60 = \frac{150}{420} = \frac{5}{14}$ degree, Ans.

(6.) $5\frac{1}{3}$ dr. $= \dfrac{5\frac{1}{3}}{60} = \frac{1}{3}$ oz.
$13\frac{1}{3}$ oz. $= \frac{40}{3}$; $\frac{40}{3} \div 16 = \frac{5}{6}$ lb.
$20\frac{5}{6}$ lb. $= \frac{125}{6}$; $\frac{125}{6} \div 25 = \frac{5}{6}$ qr.
$2\frac{5}{6}$ qr. $= \frac{17}{6}$; $\frac{17}{6} \div 4 = \frac{17}{24}$ cwt., Ans.

(8.) 1 pt. ÷ 2 = .5 qt.
.5 qt. ÷ 4 = .125 gal.
55.125 ÷ 63 = .875 hhd., Ans.

(9.) 3 ÷ 12 = .25 ft.
8.25 ÷ $16\frac{1}{2}$ = .5 rd.
32.5 ÷ 40 = .8125 fur.
3.8125 ÷ 8 = .4765625 mile, Ans.

(10.) 15 ÷ 160 = .09375 acre, Ans.

(11.) 7 ÷ 25 = .28 qr.
3.28 ÷ 4 = .82 cwt.
2.82 ÷ 20 = .141 ton,
5.141 tons, Ans.

(12.) 50.4 ÷ 60 = .84 minute,
15.84 ÷ 60 = .264 hour,
18.264 ÷ 24 = .761 day, Ans.

(13.) 1 lb. 4 oz. 12 pwt. 12 gr. = 7980 grains,
2 oz. 15 pwt. 10 gr. = 1330 grains,
1330 ÷ 7980 $= \frac{1330}{7980} = \frac{1}{6}$, Ans.

(14.) 7 bu. 1 pk. = 464 pt.
2 qt. 1 pt = 5 pt.
5 ÷ 464 $= \frac{5}{464}$, Ans.

(15.) 3 acres = 480 rd.
1 A. 26 rd. = 186 rd.
186 ÷ 480 = $\frac{186}{480}$ = $\frac{31}{80}$, Ans.

(16.) 1 T. 6 cwt. 15 lb. 10 oz. = 41850 oz.
10 cwt. 46 lb. 4 oz. = 16736 oz.
16736 ÷ 41850 = $\frac{16736}{41850}$ = $\frac{2}{5}$, Ans.

(17.) 148 m. 4 fur. = 47520 rd.
18 m. 4 fur. 20 rd. = 5940 rd.
5940 ÷ 47520 = .125, Ans.

(18.) 7 weeks, 4 days = 76320 min.
2 days, 17 min. = 2897 min.
2897 ÷ 76320 = .0379585+, Ans.

(19.) 45 tons, 15 cwt. 25 lb. = 91525 lb.
6 tons, 10 cwt. 75 lb. = 13075 lb.
13075 ÷ 91525 = .142857, Ans.

APPLICATIONS.

(Pages 169–171.)

(1.)

lb.	oz.	pwt.
2	3	6
12		
27		
20		
546 pwt., Ans.		

(2.) 3 cwt. 63 lb. = 363 lb.
363 × .05 = $18.15, Ans.

(3.) 80 × 65 = 5200 sq. rd.
5200 ÷ 160 = 32 A. 80 P., Ans.

(4.) 63 gal. = 504 pt.
1 qt. 1 pt. = 3 pt.;
504 ÷ 3 = 168 bottles, Ans.

(5.) 100.14 × 12.45 × 10 = 12467.43 sq. ft.;
12467.43 × .27 = 461.756+ cu. yd.;
461.756 × .20 = $92.351+, Ans.

(6.) 45 min. = $\frac{3}{4}$ hour;
300 × 40 × $\frac{3}{4}$ = 9000 hours;
9000 × .15 = $1350, Ans.

(7.) 788436 ÷ $272\frac{1}{4}$ = 2896 sq. rd.;
2896 × $\frac{5}{8}$ = $1810, Ans.

(8.) 353.79 ÷ .03 = 11793 lb.;
11793 lb. = 5 tons 17 cwt. 3 qr. 18 lb., Ans.

(9.) 100 × 4 × 12 = 4800 solid ft.;
4800 ÷ 128 = $37\frac{1}{2}$ cords;
$37\frac{1}{2}$ × 5 = $187.50, Ans.

(10.) 1868 and 1872, Ans.

(11.) 24 ft. = 8 yd.; 18 ft. = 6 yd.;
8 × 6 = 48 sq. yd., Ans.

(12.) 2 qr. 20 lb. = 50 lb. + 20 lb. = 70 lb.;
2 T. 5 cwt. = 40 cwt. + 5 cwt. = 45 cwt.;
45 cwt. + 70 lb. = 45.70 cwt.;
$9 × 45.70 = $411.30, Ans.

(13.) 16 years of $365\frac{1}{4}$ days = 5865 days;
3 weeks of 7 days = 21 days;
5886 × 24 = 140760 hours;
140760 hours + 18 hours = 140778 hours;
140778 × 60 = 8446680 minutes;
8446680 + 30 = 844710 minutes, Ans.

(14.) $264.25 \div 3.50 = 75.5$ gallons;
$= 1$ hhd. 12 gal. 2 qt., Ans.

(15.) $229.05 \div 9 = 25.45$ cwt. $=$
1 T. 5 cwt. 1 qr. 20 lb., Ans.

(16.) March has 31 days $= 44640$ minutes;
February has 29 days $= 41760$ minutes;
$44640 - 41760 = 2880$ minutes, Ans.

(17.) $.62137 \times 31.5 = 19.573155$ miles;
$.573155 \times 8 = 4.585240$ fur.;
$.58524 \times 40 = 23.4096$ rd.;
$.4096 \times 16\frac{1}{2} = 6.7584$ ft.;
Ans. 19 m. 4 fur. 23 rd. 6.7584 ft.

(18.) $8 \times 4 \times 6\frac{1}{2} = 208$ cu. ft.;
$208 \div 128 = 1$ C. 80 cu. ft.;
$80 \div 16 = 5$ cu. ft.;
1 C. 5 cu. ft., Ans.

(19.) $.9628 \times 365 = 351.422$ days;
$.422 \times 24 = 10.128$ hours;
$.128 \times 60 = 7.68$ minutes;
$.68 \times 60 = 40.8$ seconds;
351 d. 10 h. 7 m. 40.8 sec., Ans.

(20.) $80.5 \times .3524 = 28.3682$ hectoliters, Ans.

(21.) 1 lb. av. $= 7000$ Troy grains;
$7000 \div 15 = 466\frac{2}{3}$ doses; $466\frac{2}{3} \times .20 = \$93.33\frac{1}{3}$, Ans.

(22.) $.695 \times 2000 = 1390$ lb.;
$1390 \times .08 = \$111.20$, Ans.

(23.) 4 d. 3 h. $= 99$ hours;
2 w. $6\frac{1}{4}$ d. $= 486$ hours;
$486 \div 99 = 4.909+$, Ans.

(24.) 69.5 — 69.16 = .34 mile;
.34 × 360 = 122.4 miles;
.4 m. 3 fur. 8 rd.; 122 m. 3 fur. 8 rd., **Ans.**

(25). 40′ 30″ = 2430″;
60° 45′ = 218700″;
218700 ÷ 2430 = 90 minutes = 1 h. 30 m., Ans.

(26.) 112 × 25 × 2 = 5600 sq. ft.;
5600 × 6 = 33600 shingles, Ans.

(ART. 251, pp. 171–173.)

(6.) 1227 cu. yd. 1 cu. ft. 524 cu. in., Ans.

(8.) 124 bu. 3 pk. 0 qt. 1 pt., Ans.

(ART. 252, pp. 173, 174.)

(4.) $\frac{3}{4}$ mile = 6 furlongs;
$\frac{7}{10}$ fur. = 28 rds.;
6 fur. 28 rd., Ans.

(15.)	A.	P.
.6 acres =		96
.85 acres =		136
	17	32
	18	104, Ans.

(16.)

	d.	h.	m.	sec.
$\frac{1}{3}$ week =	2	8	0	0
$\frac{9}{13}$ day =	0	16	36	$55\frac{5}{13}$
$\frac{1}{2}$ hour =	0	0	30	0
Ans.	3	1	6	$55\frac{5}{13}$

(PAGES 174, 175.)

(1.)	T.	cwt.	qr.	lb.
	1	14	1	17
	1	0	2	17
	1	0	2	10
	3	15	2	19, Ans.

(2.)	lb.	oz.	pwt.	gr.
	11	4	16	11
	2	5	6	14
	6	7	14	17
	20	5	17	18, **Ans.**

(3.)

	rd.	yd.	ft.	in.
	0	2	2	7
$\frac{6}{55}$ of mile =	34	5	0	0
$\frac{3}{88}$ of fur. =	1	2	0	0
		3	1	11
	37	2	1	6, Ans.

(4.)

C.	cu. ft.	cu. in.
50	104	172
30	110	100
45	48	0
9	56	678
136	62	950, Ans.

(5.)

Jan.	31	days,
Feb.	28	"
Mar.	31	"
Apr.	30	"
May	16	"
	136	" Ans.

(6.)

°	′	″
4	45	0
3	0	45
2	25	5
3	10	15
13	21	5, Ans.

(7.)

°	′	″
39	58	24
32	24	3
72	22	27, Ans.

(8.)

	A.	P.
5.88125 acres =	5	141
19⅝ acres =	19	100
	41	17
	66	98, Ans.

(Art. 253, p. 176.)

(5.)

hhd.	gal.	qt.	pt.	gi.
1	2	1	0	3
	13	3	1	0
	51	1	1	3, Ans.

(7.)

d.	h.	m.
365	0	0
310	5	45
54	18	15, Ans.

(Art. 254, p. 176.)

(10.)

	lb.	oz.	dr.
$\frac{2}{3}$ of a gr. =	16	10	$10\frac{2}{3}$
$\frac{5}{9}$ of a lb. =		8	$14\frac{2}{9}$
	16	1	$12\frac{4}{9}$, Ans.

(11.)

	P.	ft.	in.
$\frac{2}{3}$ of an acre =	106	181	72
$\frac{7}{16}$ of an acre =	70		
Ans.	36	181	72

(12.) $\frac{1}{4}$ of a sq. yd. = $\frac{1}{4}$ of 1296 sq. in. = 324 sq. in.
$\frac{1}{6}$ of a yard = 6 × 6 sq. in. = 36 sq. in.
Ans. 288 sq. in.

(13.) .37 of a degree = 22′ 12″
$\frac{5}{14}$ of a degree = 21 $25\frac{5}{7}$
$46\frac{2}{7}$″, Ans.

(Art. 255, p. 177.)

(15.)

y.	m.	d.
1866	8	5
1807	1	14
59	6	22, Ans.

(16.)

y.	m.	d.	h.
1865	0	8	6
1776	6	4	13
88	6	3	17, Ans.

(17.)

y.	m.	d.
1865	3	3
1492	9	14
372	5	22, Ans.

(18.)

y.	m.	d.
1861	3	14
1783	0	20
78	2	24, Ans.

(Pages 177, 178.)

(1.)

T.	cwt.	qr.	lb.
20	0	2	14
10	13	2	14
9	7	0	0, Ans.

(2.)

C.	cu. ft.
7	0
2	78
4	50, Ans.

(3.)

m.	fur.	rd.
98	5	3
12	6	4*
85	6	39, Ans.

(4.)

°	′	″
122	26	48
71	3	30
51	23	18, Ans.

(5.)

°	′	″
42	0	0
29	57	30
12	2	30, Ans.

(7.) 29 — 22 = 7 days in Feb.

Feb.		Mar.		Apr.		May.		June.		July.		
7	+	31	+	30	+	31	+	30	+	4	=	133, Ans.

(8.) 1880 — 1820 = 60 ÷ 4 = 15, Ans.

(10.)

bu.		bu.	pk.	qt.
$325\frac{15}{16}$	=	325	3	6
$43\frac{5}{8}$	=	43	2	4
		587	3	7
		957	2	1

bu.	pk.	qt.
367	2	4
56	2	3
35	3	2
298		
758	0	1

bu.	pk.	qt.
957	2	1
758	0	1
199	2	0, Ans.

(Art. 256, p. 179.)

(5.) 221 d. 10 h. 53 m. 36 sec., Ans.

(Page 180.)

(2.) 1 lb. 7 oz. 14 pwt., Ans.

(5.) 46 yd. $1\frac{1}{2}$ qr., Ans.

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* $\frac{1}{10}$ of a furlong = 4 rd.

(ART. 257, p. 181.)

(4.) 1 cwt. 0 qr. 9 lb. 2 oz. $10\frac{1}{2}$ dr., Ans.

(6.) 2 lb. 7 oz. 9 pwt. 22 gr., Ans.

(8.) 111 C. 7 c. ft. 7 cu. ft., Ans.

(ART. 258, p. 182.)

(10.) 5 pwt. 9 gr. = 129 gr.; 9 lb. 9 oz. 3 pwt. 12 gr. = 56244 gr.; 56244 ÷ 129 = 436, Ans.

(11.) 17 m. 5 fur. 27 rd. = 5667 rd.; 513 m. 4 fur. 23 rd. = 164343 rd.; 164343 ÷ 5667 = 29, Ans.

(PAGE 182.)

(2.) 12 cwt. 1 qr. 23 lb., Ans.

(3.) 7 lb. 6 oz. 13 pwt. ÷ 24 = 3 oz. 15 pwt. 13 gr., Ans.

(5.) 4 bu. 3 pk. = 19 pk.; 456 bu. = 1824 pk.; 1824 ÷ 19 = 96, Ans.

(7.) 12 m. 3 fur. 19 rd. = 3979 rd.; 174 m. 0 fur. 26 rd = 55706 rd.; 55706 ÷ 3979 = 14, Ans.

LONGITUDE AND TIME.

(ART. 259, p. 183.)

(1.) 15)77° 2′ 48″

5 h. 8 m. $11\frac{1}{5}$ sec. later at Greenwich

= 2 h. 8 m. $11\frac{1}{5}$ sec. P. M., Ans.

(2.)

m.	sec.
40	$2\frac{2}{5}$
	15
10 0	36

90°	15′	10″
10	0	36
80	14	34, Ans.

(3.) 15)48° 26′ 45″

3 h. 13 m. 47 sec. later at N. Y.

10 o'clock P. M. + 3 h. 13 m. 47 sec. =

1 h. 13 m. 47 sec. A. M. the day following, or Jan. 1, 1866, Ans.

(4.)

h.	m.	sec.
2	45	30
		15
41°	22′	30″, Ans.

PRACTICE.

(Art. 261, p. 185.)

(4.)

60 acres, cost	$4800
80 rd., or ½ acre, cost	40
40 rd., or ½ 80 rd.	20
The whole cost	$4860, Ans.

(5.)

13 gal. at $.60 =	$7.80
2 qt. = ½ gal. =	.30
1 qt. = ½ of 2 qt. =	.15
1 pt. = ½ qt. =	.07½
	$8.32½, Ans.

(6.)

10 miles at $6490 cost	$64900
4 fur. = ½ mile, cost	3245
2 fur. = ½ of 4 fur. cost	1622.50
20 rd. = ¼ of 2 fur.	405.62½
	$70173.12½, Ans.

(7.)

2117 at 25 cts. or ¼ of a $, cost	$529.25
" " 12½ cts. or ⅛ of a $, "	264.625
	$793.875, Ans.

(8.)

120 yd. at $1.00 cost	$120.00
" " " 2.00 "	240.00
" " " .50 "	60.00
" " " .16⅔ "	20.00
	$440.00, Ans.

(9.)

10 bu. at $.88 cost	$8.80
10 " " " "	8.80
4 " " " "	3.52
2 pk. or ½ bu. "	.44
4 qt. or ½ pk. "	.11
	$21.67, Ans.

(10.) 10 d. 8 h. = 10⅓ days.

	m.	fur.	rd.
10⅓ days at 18 miles per day =	186	0	0
" " " 5 fur. " "	6	3	26⅔
" " " 16 rd. " "		4	5⅓
	192	7	32, Ans.

(11.)

6 m. = ½ year, the rent =	½ of $240 =	$120.00
2 m. = ⅓ of 6 mo. "	⅓ of $120	40.00
1 m. = ½ of 2 mo. "	½ of $40	20.00
15 d. = ½ of 1 mo. "	½ of $20	10.00
5 d. = ⅓ of 15 d. "	⅓ of $10	3.33⅓
5 d. = ⅓ of 15 d. "	⅓ of $10	3.33⅓
	Ans.	$196.66⅔

(12.)

108 cu. yd. at $.42 cost	$45.36
18 cu. ft. = ⅔ of a cu. yd. cost ⅔ of $.42	.28
	$45.64, Ans.

REVIEW EXERCISES.

(PAGES 186, 187.)

(1.) 1 T. 5 cwt. 56 lb. = 2556 lb.
2556 lb. at \$.10 = \$255.60
" " \$.01 = 25.56
\$281.16, Ans.

(2.) 281.16 ÷ 11 = 2556 lb. = 1 T. 5 cwt. 56 lb., Ans.

(3.) At \$.20 per sq. rd., 160 sq. rd., or 1 acre, cost \$32.
$\frac{1}{2}$ of 640 acres = 320 acres.
320 × 20 = \$6400
320 × 32 = 10240
10240 — 6400 = \$3840, Ans,

(4.) $\frac{8}{9}$ lb. = 5120 grains × .02 = \$102.40, Ans.

(6.) 10 lb. Av. = 70000 grains Troy
= 12 lb. 1 oz. 16 pwt. 2 gr. = 12.1534+ lb.;
\$6.50 × 12.1534 = \$78.99+;
\$6.50 × 10 = \$65.00;
\$78.99 — \$65.00 = \$13.99, Ans.

(7.) 8 h. 4 m. = 29040 sec.;
$\frac{5}{6}$ of 29040 sec. = 24200 sec. =
6 h. 43 m. 20 sec., Ans.

(8.) $\frac{1}{25}$ of 2 tons = 160 lb.;
160 lb. cost \$1.80; then,
100 lb. cost $\frac{100}{160}$ = $\frac{5}{8}$ of \$1.80 = \$1.12$\frac{1}{2}$, Ans.

(9.) 29.5 × 11.25 = 331.875 sq. ft.;
331.875 ÷ 9 = 36.875 sq. yd.
If $\frac{5}{8}$ yd. width cost $1.50,
$\frac{8}{8}$, or 1 yd. wide, cost 8 times $\frac{1}{5}$ of $1.50, or $2.40;
36.875 × 2.40 = $88.50, Ans.

(11.) 1 acre = 160 rd.;
160 ÷ 42.4 = 3.77+ rd., Ans.

(12.) From Apr. 16 to March 31 = 11$\frac{1}{2}$ months; $25 × 11$\frac{1}{2}$ = $287.50, Ans.

(13.) 2 bushels = 4300.84 cu. in.;
4300.84 ÷ 231 = 18.62 liquid gal.;
15 cts. a qt. = 60 cts. a gal., and
18.62 × .60 = $11.17+;
2 bu. at $4.80 = $9.60;
$11.17 — $9.60 = $1.57, Ans.

(15.) 1 hectoliter = 2.837 bushels;
2.837 × 40 = 113.48 bu.;
1 hectare = 2.471 acres;
113.48 ÷ 2.471 = 45.9+ bu., Ans.

(16.) 132 × 4 × 1$\frac{1}{2}$ = 792 cu. ft.;
792 ÷ 24.75 = 32;
$2.25 × 32 = $72, Ans.

(18.) 4 C. 6 c. ft. = 608 cu. ft.;
4 × 6 = 24 ft.;
608 ÷ 24 = 25$\frac{1}{3}$ ft., Ans.

(19.) 30° + 7° 30′ = 37° 30′,
37° 30′ ÷ 15 = 2 h. 30 m. earlier at the former place
= 10 h. 30 m. P. M. July 3d, Ans.

PERCENTAGE.

(Art. **264**, pp. **188**, **189**.)

(5.)	Ans. $.00\frac{1}{2}$, or .005	(16.)	Ans. $\frac{3}{8}$
(6.)	$.00\frac{1}{4}$ " .0025	(17.)	$\frac{1}{6}$
(7.)	$.00\frac{3}{10}$ " .003	(18.)	$\frac{73}{1000}$
(8.)	$.07\frac{3}{10}$ " .073	(19.)	$\frac{5}{8}$
(9.)	.45	(23.)	$16\frac{2}{3}$ %
(10.)	.90	(24.)	3.20 "
(11.)	1.50	(25.)	80 "
(12.)	2.75	(26.)	590 "

(Page **190**.)

(2.) $43 \times .05\frac{1}{2} = 2.365$ yd., Ans.

(3.) $100\,\% - .87\frac{1}{2}\,\% = 12\frac{1}{2}\,\%$, or $\frac{12\frac{1}{2}}{100} = \frac{1}{8}$;
$\frac{1}{8}$ of \$2250 = \$281.25, Ans.

(4.) $3160 \times .15\frac{1}{2} = 489.8$;
$3160 - 489.8 = 2670.2$; $2670.2 \times .05 = 133.51$;
$2670.2 - 133.51 = 2536.69$ barrels;
$2536.69 \times 3 =$ \$7610.07, Ans.

(Art. **267**, p. **191**.)

(3.) $\frac{57}{600} = .09\frac{1}{2} = 9\frac{1}{2}\,\%$, Ans.

(5.) $\frac{782.80}{760.00} = 1.03 = 103\,\%$, Ans.

(7.) $\frac{28.47}{657.00} = .04\frac{1}{3} = 4\frac{1}{3}\,\%$, Ans.

(11.) 5 cwt. 2 qr. $21\frac{1}{2} = 571\frac{1}{2}$ lb.
12 cwt. 2 qr. 20 lb. = 1270 lb.
$\frac{571.5}{1270} = .45 = 45\,\%$, Ans.

(Page 191.)

(1.) $\frac{20}{4000} = \frac{1}{200} = .005 = \frac{1}{2}\ \%$, Ans.

(2.) $\frac{2.365}{43} = .055 = 5\frac{1}{2}\ \%$, Ans.

(4.) $5600 - 4802 = 798$;
$\frac{798}{5600} = .14\frac{1}{4} = 14\frac{1}{4}\ \%$, Ans.

(5.) $235 - 110 = 125$;
$\frac{125}{235} = \frac{25}{47} = .53\frac{9}{47}\ \%$, Ans.

(6.) 100 acres increased by 50 % = 150 acres;
100 acres decreased by 50 % = 50 acres;
$\frac{50}{150} = .33\frac{1}{3} = 33\frac{1}{3}\ \%$, Ans.

(Art. 268, p. 192.)

(3.) $57 \div .09\frac{1}{2} = 600$, Ans.

(6.) $235.50 \div .157 = 1500$, Ans.

(Art. 269, p. 192.)

10.) If $242.14 = $\frac{25}{100}$, or $\frac{1}{4}$ of a number;
$\frac{4}{4}$, or the number, = 4; $242.14 × 4 = $968.56, Ans.

(Page 193.)

(1.) $10.08 \div .16 = 63$ gal., Ans.

(2.) \$8 $\div$ .004 = \$2000, Ans.

(3.) $\frac{37\frac{1}{2}}{100} = \frac{3}{8}$; if \$281.25 = $\frac{3}{8}$, then $\frac{8}{8}$ = 8 times $\frac{1}{3}$ of
\$281.25 = \$750, Ans.

(4.) 17 bu. 2 pk. = 70 pk.;
$70 \div .07\frac{1}{2} = 933\frac{1}{3}$ pk. = 233 bu. $1\frac{1}{3}$ pk., Ans.

(5.) $75 + 93 + 112 = 280$;
$280 \div .175 = 1600$, Ans.

(6.) $\$393 \div .131 = \$3000$;
$\$3000 - \$393 = \$2607$, Ans.

(Art. **270**, p. **194**.)

(3.) $7402 \div 1.175 = 6299.57+$, Ans.

(8.) $100\,\% - 9\frac{1}{2} = 90\frac{1}{2}\,\%$;
$543 \div .905 = 600$ men, Ans.

(9.) $100\,\% - 10\,\% = 90\,\%$;
$\frac{14}{25} \div \frac{90}{100} = \frac{14}{25} \times \frac{100}{90} = \frac{28}{45}$, Ans.

(Art. **271**, p. **194**.)

(11.) $33\frac{1}{3}\,\% = \dfrac{33\frac{1}{3}}{100} = \frac{1}{3}$;
$\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$; $620 \div \frac{2}{3} = 930$, Ans.

(12.) $16\frac{2}{3}\,\% = \dfrac{16\frac{2}{3}}{100} = \frac{1}{6}$;
$\frac{6}{6} + \frac{1}{6} = \frac{7}{6}$; $\frac{3}{4} \div \frac{7}{6} = \frac{9}{14}$, Ans.

(Pages **194, 195**.)

(1). $3640 \div 1.12 = 3250$, Ans.

(2.) $100\,\% - 31\frac{1}{4}\,\% = 68\frac{3}{4}\,\%$;
$440 \div .68\frac{3}{4} = 640$, Ans.

(4.) $12\frac{1}{2}\,\% = \dfrac{12\frac{1}{2}}{100} = \frac{1}{8}$;
$\frac{8}{8} + \frac{1}{8} = \frac{9}{8}$; $4059 \div \frac{9}{8} = 3608$, Ans.

(5.) 26 d. 10.4 h. = 634.4 hours;
$100\,\% + 30\,\% = 130\,\% = \frac{130}{100} = \frac{13}{10}$;
$634.4 \div \frac{13}{10} = 488$ h. = 20 d. 8 h., Ans.

COMMISSION AND BROKERAGE.

(ART. 276, p. 196.)

(3.) $10000 × $.00\frac{1}{4}$ = $25, Ans.

(ART. 277, p. 197.)

(9.) $3838.80 ÷ 1.05 = $3656, Ans.

(10.) $581.85 ÷ 1.025 = 567.65+, Ans.

(11.) $2050 ÷ 1.025 = $2000;
$2000 ÷ 10 = 200 barrels, Ans.

(12.) $11000 ÷ $1.00\frac{7}{8}$ = $10904.58+, Ans.

(13.) $64890 ÷ 1.03 = $63000;
$63000 ÷ 700 = $90, Ans.

INSURANCE.

(ART. 282, p. 198.)

(2.) $3560 × .02 = $71.20, Ans.

(3.) $5000 × .03 = $150;
$150 + $1 = $151, Ans.

(4.) 45 — 36 = 9 years;
$541.30 × 9 = $4871.70. Ans.

(5.) $7500 × .025 = $187.50, Ans.

(6.) $98000 × $.03\frac{1}{4}$ = $3185;
$98000 — $3185 = $94815, Ans.

PROFIT AND LOSS.

(Art. **285**, p. **199.**)

(2.) $2340 \times .15 = \$351$, Ans.

(3.) $\$8500 \times .21\frac{1}{2} = \$1827.50$, Ans.

(4.) $\$5000 \times .09 = \$450$, Ans.

(6.) $33\frac{1}{3}\,\% = \frac{33\frac{1}{3}}{100} = \frac{1}{3}$;
$\frac{1}{3}$ of $\$.12 = \$.04$; $\$.12 + \$.04 = \$.16$ per lb., Ans.

(7.) $.12\frac{1}{2}\,\% = \frac{12\frac{1}{2}}{100} = \frac{1}{8}$;
$\frac{1}{8}$ of $\$.80 = \$.10$; $\$.80 + \$.10 = \$.90$, Ans.

(8.) $10\,\% = \frac{10}{100} = \frac{1}{10}$;
$\frac{1}{10}$ of $\$130 = \$13$; $\$130 - \$13 = \$117$, Ans.

(9.) $63 \times 60 = 3780$ gal.;
$\$1512 \div 3780 = \$.40$ cost per gal.;
$.15\,\% = \frac{15}{100} = \frac{3}{20}$;
$\frac{3}{20}$ of $\$.40 = \$.06$; $\$.40 + \$.06 = \$.46$, Ans.

(Art. **286**, p. **200.**)

(2.) $14 \div 84 = 16\frac{2}{3} = 16\frac{2}{3}\,\%$, Ans.

(3.) $.90 \div 4.50 = .20 = 20\,\%$, Ans.

(4.) $6.00 - 4.50 = 1.50$;
$1.50 \div 4.50 = .33\frac{1}{3} = 33\frac{1}{3}\,\%$, Ans.

(5.) $250 + 10 = \$260$ cost;
$260 - 234 = \$26$;
$26 \div 260 = .10 = 10\,\%$, Ans.

(6.) 10.20 × 50 = \$510 cost;
\$85 ÷ \$510 = $.16\frac{2}{3}$ = $16\frac{2}{3}$ %, Ans.

(7.) If $\frac{1}{2}$ be sold for $\frac{4}{5}$ of the cost,
$\frac{2}{2} = \frac{8}{5}$ of the cost, the gain is $\frac{8}{5} - \frac{5}{5} = \frac{3}{5}$; and $\frac{3}{5}$ =
[60 %, Ans.

(8.) If the price of $\frac{3}{4}$ = the cost of the whole, or $\frac{3}{3}$,
$\frac{1}{4} = \frac{1}{3}$ of the cost, and $\frac{1}{3}$ = $33\frac{1}{3}$ %, Ans.

(9.) \$5000 — \$500 = \$4500;
\$4500 — \$4000 = \$500;
\$500 ÷ \$4500 = $.11\frac{1}{9}$ = $11\frac{1}{9}$ %, Ans.

(Art. 287, p. 201.)

(2.) \$.90 ÷ .20 = \$4.50, Ans.

(3.) \$15 ÷ .0125 = \$1200, Ans.

(5.) 100 % — 95 % = 5 %;
\$.30 ÷ .05 = \$6.00, Ans.

(7.) 100 % — 15 % = 85 %;
\$204 ÷ .85 = \$240, Ans.

(8.) 100 % — $8\frac{1}{3}$ % = $91\frac{2}{3}$ %;
\$.55 ÷ $.91\frac{2}{3}$ = \$.60, Ans.

(9.) 100 % + 18 % = 118 %;
\$1.70 ÷ 118 = \$1.44, Ans.

(10.) \$4550 ÷ 700 = \$6.50;
100 % + 4 % = 104 %,
\$6.50 ÷ 1.04 = \$6.25, Ans.

REVIEW EXERCISES.

(PAGE 202.)

(1.) 4 ft. = 48 inches.
If it falls short 3 inches, it falls short $\frac{3}{48} = \frac{1}{16} =$
[6¼ %, Ans.

(2.) $\frac{25}{1250} = \frac{1}{50} =$ 2 %, Ans.

(3.) $550 ÷ .05 = 11000, Ans.

(5.) 100 % + 10 % = 110 %;
$.88 ÷ 1.10 = $.80 cost;
$1.00 — $.80 = $.20;
$.20 ÷ $.80 = .25 = 25 %, Ans.

(6.) 100 % — 12 % = 88 %;
$132 ÷ .88 = $150 cost;
$159 — $150 = $9;
$9 ÷ $150 = .06 = 6 %, Ans.

(8.) 100 % + 25 % = 125 %;
20 % of 125 % = .25 %;
125 % — 25 % = 100 % cost.
Therefore, nothing is gained.

(9) 100 % + 25 % = 125 %;
$6000 ÷ 1.25 = $4800, cost of the first farm;
100 % — 25 % = 75 %;
$6000 ÷ .75 = $8000, cost of the second farm;
$8000 + $4800 = $12800;
$6000 × 2 = $12000;
$12800 — $12000 = $800 loss, Ans.

INTEREST.

(ART. **294**, p. **206**.)

(2.) $960.50
.08
76.84
2
$153.68, Ans.

(3.) $150.40
.05
$7.5200
4
$30.08, Ans.

(4.) $1700
.06
$102.00
5
$510, Ans.

(5.) $8000
.073
24000
56000
$584.000
3
$1752, Ans.

(6.) $9080
.035
45400
27240
317.80
$2\frac{1}{2}$
63560
15890
$794.50, Ans.

(7.) $71.20
$.04\frac{1}{4}$
28480
1780
3.0260
$1\frac{2}{3}$
3.0260
2.0172
5.0432+, Ans.

(8.) $30.16
.07
$2.1112
$1\frac{5}{6}$
2.1112
1.7590
$3.8702, Ans.

(9.) $56.78
.10
$5.6780
3
Int. for 3 yrs. = $17.034
“ “ 6 mo. = 2.839
“ “ 3 “ = 1.419+
“ “ 1 “ = .473
“ “ 1 “ = .473
Ans. $22.238+

(10.) $300
.06
$18.00
2
Int. for 2 yrs. = $36.00
“ “ 6 mo. = 9.00
“ “ 1 “ = 1.50
“ “ 15 days = .75
Ans. $47.25

(11.) $444
.05½
$22.20
2.22
$24.42
6
Int. for 6 yrs. = $146.52
“ “ 4 mo. = 8.14
“ “ 1 “ = 2.035
“ “ 6 d. = .407
“ “ 1 d. = .067
Ans. $157.169+

(12.) $19000
.09
$1710.00
9
Int. for 2 yrs. = $3420.00
“ “ 1 mo. = 142.50
“ “ 1 “ = 142.50
“ “ 2 d. = 9.50
Ans. $3714.50

(13.) $2000
.073
6000
14000
Int. for 1 yr. = $146.
5
“ “ 5 “ = $730.
“ “ 3 mo. = 36.50
“ “ 1 “ = 12.166
“ “ 10 d. = 4.055+
Ans. $782.721+

(14.) $575
.06
Int. for 1 yr. = $34.50
2
“ “ 2 “ = 69.00
“ “ 6 mo. = 17.25
“ “ 15 d. = 1.437+
$87.687+
575
Ans. $662.687+

(15.)
$1234.56
.07
Int. for 1 yr. = $86.4192
8
" " 8 " = $691.3536
" " 4 mo. = 28.8064
" " 4 " = 28.8064
" " 1 " = 7.2016
" " 10 d. = 2.4005
$758.5685
1234.56
$1993.1285+, Ans.

(Art. 295, p. 208.)

(17.)
$\frac{1}{2}$ of 5 mo. = .025
$\frac{1}{6}$ of 6 d. = .001
.026

$64.24
.026
38544
12848
$1.67, Ans.

(18.) $19.60 × .175 = $3.43, Ans.
(19.) $75 × .083$\frac{1}{3}$ = $6.25, Ans.
(20.) 1000 × .141$\frac{1}{2}$ = $141.50, Ans.
(21.) $2000 × .04 = $80, Ans.
(22.) $600.80 × .075 = $45.06, Ans.
(24.) $1200 × .004$\frac{1}{6}$ = $5, Ans.
(25.) 3540 × .0095 = $33.63, Ans.

(Art. 296, p. 209.)

(27.) Principal = $140
Int. for 60 days = $\frac{1}{100}$ of prin. = $1.40
" " " " " " " " " 1.40
" " 3 " " $\frac{1}{20}$ " 60 days = .07
$2.87, Ans.

(28.) Principal = \$44.80
4 m. 9 d. = 129 days.
Int. for 6 days = $\frac{1}{1000}$ of prin. = .0448
129 ÷ 6 = 21½ .21½
448
896
224
\$.9632, Ans.

(29.) Principal = \$3000
Int. for 60 days = $\frac{1}{1000}$ of prin. = \$3.00
“ “ 3 “ = $\frac{1}{20}$ of $\frac{1}{1000}$ “ = .15
\$3.15, Ans.

(30.) Principal = \$1120.60
Int. for 5 months = $\frac{1}{40}$ of prin. = \$28.015
“ “ 1 “ = $\frac{1}{5}$ of $\frac{1}{40}$ = 5.603
“ “ 10 days = $\frac{1}{3}$ of $\frac{1}{5}$ = 1.867
“ “ “ “ “ “ “ “ “ 1.867
\$37.352, Ans.

(31.) Principal = \$8000
Int. for 15 days = $\frac{1}{400}$ of prin. = \$20, Ans.

(32.) Principal = \$1880.85
Int. for 1 month = $\frac{1}{200}$ of prin. = \$9.404+
“ “ 3 days = $\frac{1}{10}$ of $\frac{1}{200}$ = .940
\$10.344+, Ans.

(ART. **297**, pp. **209**, **210**.)

(33.) Principal = \$1385.50
Int. at 6 % for 20 days = $\frac{1}{300}$ of prin. = \$4.618+
“ “ “ “ 2 “ “ $\frac{1}{10}$ of $\frac{1}{300}$ “ “ .461
“ “ “ “ 1 “ “ $\frac{1}{2}$ of $\frac{1}{10}$ “ “ .231
6)5.310+
$\frac{1}{6}$ of int. at 6 % = .885
Int. at 7 % = \$6.195+, Ans.

(34.) Principal = \$3600
Int. at 6 % for 60 days = $\frac{1}{100}$ of prin. = \$36.00
" " " " 6 " " $\frac{1}{10}$ of $\frac{1}{100}$ = 3.60
Int. at 6 % = \$39.60
$\frac{1}{6}$ of int. at 6 % = 6.60
\$46.20, Ans.

(35.) Principal = \$1600
Int. at 6 % for 20 d. = $\frac{1}{300}$ of prin. = \$5.33$\frac{1}{3}$
" " " " 1 " " $\frac{1}{6000}$ " " .26$\frac{2}{3}$
\$5.60
$\frac{1}{6}$ of int. at 6 % = .93+
\$4.67, Ans.

(36.) Principal = \$15600
Int. at 6 % for 12 d. = $\frac{1}{500}$ of prin. = \$31.20
" " " " 1 " " $\frac{1}{6000}$ " " 2.60
\$33.80
$\frac{1}{6}$ of int. at 6 % = 5.63+
Int. at 5 % = \$28.17, Ans.

(37.) Principal = \$21.40
Int. at 6 % for 10 mo. = $\frac{1}{20}$ of prin. = \$1.070
" " " " 1 " " $\frac{1}{10}$ of $\frac{1}{20}$ of prin. = .107
Int. at 6 % = \$1.177
" " 1 % = .196
" " 7 % = \$1.373, Ans.

(38.) Principal = \$3.70
Int. at 6 % for 10 mo. = $\frac{1}{20}$ of prin. = \$.185
" " " " 2 " " $\frac{1}{100}$ " " .037
" " " " " " " " " " .037
Int. at 6 % = \$0.259
" " 1 % = .043
" " 5 % = \$.216, Ans.

(39.) $300
.09
3)27.00
9.00
$18., Ans.

(40.) $750.40
.135
375200
225120
75040
2)101.30400
50.652
$151.956, Ans.

(41.) $344.45
.130$\frac{1}{2}$
1033350
34445
17222
6)44.95072
7.4917+
$52.4424+, Ans.

(42.) $68.75
.081$\frac{2}{3}$
6875
55000
4583
6)5.61458
.93576+
$6.5502+, Ans.

(43.) 3976.18
.141$\frac{1}{3}$
397618
1590472
397618
132539
3)561.966
187.322
$749.288+, Ans.

(44.) $80
.087
560
640
6.960
80
$86.96, Ans.

(45.) $241.20
.033$\frac{1}{3}$
72360
72360
8040
6)8.04
1.34
9.38
241.20
$250.58, Ans.

(46.)
$500
.028
4000
1000
6)14.
$2.33\frac{1}{3}$
10
$23.33\frac{1}{3}$
500
$$523.33\frac{1}{3}$, Ans.

(47.)
$345.94
$.014\frac{1}{3}$
138376
34594
11531
6)4.95847
.82641+
5.78488
345.94
$351.72, Ans.

(48.)
$800
.063
2400
4800
6)50.400
8.400
42
800
$842, Ans.

(49.)
$1000
.1825
182.5000
1000
$1182.50, Ans.

(Art. 298, p. 211.)

(51.) Int. of $1000 for 1 year at $7\frac{3}{10}$ % = $73.00;
Time = 138 days.

$$\frac{138}{\underset{5}{\cancel{365}}} \text{ of } \frac{\cancel{73}}{1} = \$27.60, \text{ Ans.}$$

(52.) Int. of 6400 for 1 year at 5 % = $320;
Time = 341 days.
$\frac{341}{365}$ of $320 = $298.95, Ans.

(Art. **299**, p. **211.**)

(2.) Int. of \$75 for 1 y. 4 m. 20 d. at 1 % $= \$1.04\frac{1}{6}$;
$\$6.25 \div \$1.04\frac{1}{6} = .06 = 6\,\%$, Ans.

(3.) Int. of \$3000 at 1 % = \$70;
$\$525 \div \$70 = .07\frac{1}{2} = 7\frac{1}{2}\,\%$, Ans.

(4.) Int. of \$3600 at 1 % = \$6.60;
$\$46.20 \div \$6.60 = .07 = 7\,\%$, Ans.

(5.) Int. of \$150 at 1 % = \$6.00;
$\$30 \div \$6 = .05 = 5\,\%$, Ans.

(6.) Int. of \$444 for 6 y. 5 m. at 1 % = \$28.49;
$\$156.695 \div \$28.49 = .05\frac{1}{2} = 5\frac{1}{2}\,\%$, Ans.

(Art. **300**, p. **212.**)

(2.) Int. of \$3000 at 7 % for 1 y. = \$210;
$525 \div 210 = 2\frac{1}{2}$ years, Ans.

(3.) Int. of \$700 1 y. = \$42;
$63 \div 42 = 1\frac{1}{2}$ y. = 1 y. 6 m., Ans.

(4.) Int. of \$4080 for 1 y. = \$204;
$668.10 \div 204 =$ 3 y. 3 m. 9 d., Ans.

(5.) Int. of \$444 for 1 y. = \$24.42;
$157.16 \div 24.42 =$ 6 y. 5 m. 7 d., Ans.

(6.) Int. of \$225 for 1 y. = \$13.50;
$77.40 \div 13.50 =$ 5 y. 8 m. 24 d., Ans.

(Art. **301**, pp. **212**, **213.**)

(2.) Int. of \$1 for 1 y. 6 m. = \$.09;
$63 \div .09 = \$700$, Ans.

(3.) Int. of \$1 for 3 y. = \$.219;
$1752 \div .219 = \$8000$, Ans.

(4.) Int. of $1 for 3 y. 11 m. 21 d. = $.238$\frac{1}{2}$;
581.94 ÷ .2385 = $2440, Ans.

(5.) Int. of $1 for 6 m. 20 d. at 7 % = $.038$\frac{8}{9}$;
9.38 ÷ .038$\frac{8}{9}$ = $241.20, Ans.

(6.) Int. of $1 for 2 y. 3 m. at 9 % = $.2025;
151.875 ÷ .2025 = $750, Ans.

(Pages 213, 214.)

(1.) Time = 6 m. 6 d.;
Int. of $400 = $12.40; $400 + $12.40 = $412.40, [Ans.

(2.) $\frac{1}{2}$ of $20000 = $10000;
Int. of $10000 for 2 y. 2 m. 12 d. at 6 % = $1320;
" " " " " " " " 7 % = 1540;
$1320 + $1540 = $2860, Ans.

(4.) 1 % of $250 = $2.50 + $250 = $252.50, Ans.

(5.) Time = 2$\frac{1}{2}$ months;
1$\frac{1}{2}$ % × 2$\frac{1}{2}$ = 3$\frac{3}{4}$ %;
$200 × .03$\frac{3}{4}$ = $7.50, Ans.

(6.) Int. of $194 at 1 % = $.711$\frac{1}{3}$;
4.268 ÷ .711$\frac{1}{3}$ = 6 %, Ans.

(7.) Int. of $114 for 1 y. at 7 % = $7.98;
13.30 ÷ 7.98 = 1$\frac{2}{3}$ y. = 1 y. 8 m., Ans.

(9.) $\frac{100}{100} \div \frac{7}{100}$ = 14$\frac{2}{7}$ years, Ans.
$\frac{100}{100} \div \frac{73}{1000}$ = 13 y. 8 m. 11$\frac{37}{73}$ d. Ans.

(10.) Int. of $1 for 2 y. 17 d. = $.143$\frac{11}{36}$;
37.26 ÷ .143$\frac{11}{36}$ = $260.00, Ans,

(11.) Time in months = 6 months;
" " days = 184 d.;
Int. of $10000 for 6 m. = $300;
" " " " 1 y. = $600;
$\frac{184}{365}$ of $600 = $302.465+
$302.465+ — $300 = $2.465+ more by the latter method, Ans.

PRESENT WORTH.

(Art. 303, pp. 214, 215.)

(2.) Amt. of $1 for 6 m. = $1.03;
250 ÷ 1.03 = $242.71+, Ans.

(3.) Amt. of $1 for 72 days = $1.014;
900 ÷ 1.014 = $887.57, Ans.

(4.) Amt. of $1 for 1 y. 4 m. = 1.10\frac{2}{3}$;
650 ÷ 1.10$\frac{2}{3}$ = $587.34+, Ans.

(5.) Amt. of $1 for 2 y. 7 m. 15 d. = $1.1575;
347.25 ÷ 1.1575 = $300, Ans.

(6.) Amt. of $1 for 2 y = $1.12;
672 ÷ 1.12 = $600, present worth;
$672 — $600 = $72, discount, Ans.

(7.) Amt. of $1 for 93 days = $1.0155;
350.75 ÷ 1.0155 = $345.396+;
$350.75 — $345.396+ = 5.36+, Ans.

(8.) Amt. of $1 for 2 y. 3 m. 20 d. = 1.161\frac{7}{18}$;
750 ÷ 1.161$\frac{7}{18}$ = $645.77+;
$750 — $645.77+ = $104.23+, Ans,

(Art. **304**, p. **215**.)

(9.) Amt. of $1 for 2 y. at 8 %, = $1.16;
1114.18 ÷ 1.16 = $960.50, Ans.

(10.) Amt. of $1 for 66 d. at 7 % = $1.012⅚;
3641.20 ÷ 1.012⅚ = $3595.06+, Ans.

(11.) Amt. of $1 for 123 d. at 6 % = $1.0205;
145.67 ÷ 1.0205 = $142.743+, Ans.

(12.) Amt. of $1 for 3 y. 3 m. 9 d. at 5 % = $1.16375;
4748.10 ÷ 1.16375 = $4080, Ans.

APPLICATIONS.

(Page **215**.)

(1.) Amt. of $1 for 9 m. = $1.045;
385 ÷ 1.045 = $368.42, Ans.

(2.) $1050 × .05 = $52.50, interest;
1050 ÷ 1.05 = $1000, present worth;
$1050 — $1000 = $50, discount;
$52.50 — $50.00 = $2.50, Ans.

(3.) $1986.48 ÷ 1.025 = $1938.02, the present worth of $1986.48;
$1938.02 — $1831.53 = $106.49, Ans.

(4.) $230 ÷ 1.0525 = $218.52, the present worth of $230;
$225 — $218.52 = $6.48, gain, Ans.

BANK DISCOUNT.

(Art. **308**, pp. **216–218.**)

(2.) Int. of $600 for 60 d. = $6.00
“ “ “ “ 3 “ “ 30
Bank discount = $6.30
$600 — $6.30 = $593.70, proceeds.

(3.) The time when due = the last day of April, or April 30th + 3 days of grace = May 3d.
Int. of $250 for 60 d. = $2.50
“ “ “ “ “ “ 2.50
“ “ “ “ 3 d “ .125
Bank discount at 6 % a year — $5.125
At 1 % a month, or 12 % a year, = 2 times $5.125 = $10.25; $250 — $10.25 = $239.75, proceeds.

(4.) 4 months after July 5th = Nov. 5; Nov. 5 + 3 days of grace = Nov. 8th, time it is due. From Sept. 5 to Nov. 8 = 2 m. 3 d., time to run.
Int. of $1650.40 for 60 days = $16.504
“ “ “ “ 3 “ “ .825
“ or bank discount, at 6 % = $17.329
$17.329 + $\frac{1}{6}$ of $17.329 = $20.217, bank discount, at 7 %; $1650.40 — $20.217 = $1630.183, proceeds.

(5.) 90 days after June 10 = Sept. 8th; and 3 days of grace = Sept. 11th, time due.
Time from July 13th to Sept. 11th = 60 days, time to run;
Int. of $5000 for 60 days = $50; $5000 — $50 = $4950, proceeds.

(Art. **309**, p. **218.**)

(2.) Proceeds of $1 for 4 m. 3 d. = $.959;
239.75 ÷ .959 = $250.00, Ans.

(3.) Proceeds of $1 for 63 days = $.9895;
593.70 ÷ .9895 = $600, Ans.

(4.) Proceeds of $1 for 93 days at 7 % = $$.981\frac{1}{12}$;
3755 ÷ $.981\frac{1}{12}$ = $3824.15, Ans.

(5.) Proceeds of $1 for 2 m. 3 d. at 2 % a month = $.958;
576 ÷ .958 = $601.25, Ans.

(6.) Proceeds of $1 for 33 days = $.9945;
994.50 ÷ .9945 = $1000, Ans.

ANNUAL INTEREST.

(Pages **219, 220.**)

(2.) Int. of $500 for 3 y. = $90.00
" " " " 1 y. = $30
" " $30 " 2 y. + 1 y., or for 3 years = 5.40
$95.40
$500 + $95.40 = $595.40, Ans.

(3.) Int. of $200 for 2 y. 6 m. 3 d. = $30.10;
" " " " 1 y. = $12; and
" " $12 for 1 y. 6 m. 3 d. + 6 m. 3 d. = 2 y. 6 d.
= $1.45+;
$30.10 + $1.45 = $31.55+, Ans.

(4.) Int. of $780 for 4 y. 2 m. = $195;
“ “ “ “ 1 y. = $46.80;
“ “ $46.80 for 3 y. 2 m. + 2 y. 2 m. + 1 y. 2 m.
+ 2 m. = 6 y. 8. m. = $18.72;
$195 + $18.72 = $213.72;
$780 + $213.72 = 993.72, Ans.

(5.) Int. of $1000 for 2 y. 6 m. = $175;
“ “ “ “ 1 y. = $70;
“ “ $70 for 1 y. 6 m. + 6 m. = 2 y. = $9.80;
$175 + $9.80 + $1000 = $1184.80, Ans.

PARTIAL PAYMENTS.

(Art. 313, pp. 221, 222.)

(2.)

Principal,		$700
Int. for 2 y. 9 m. 10 d.		118.30
Amount,		$818.30
1st payment,	$164.00	
Int. for 1 y. 11 m. 24 d.	19.13	
2d payment,	200.00	
Int. for 1 y. 5 m. 4 d.	17.13	
3d payment,	120.00	
Int. for 1 y. 2 m. 17 d.	8.74	
4th payment,	60.00	
Int. for 4 m. 23 d.	1.43	
		$590.43
Balance due,		$227.87

(3.)	Principal,		$500.00
	Int. of $500 for 1 y. at 7 %,		35.00
	Amount,		$535.00
	Payment,	$200.00	
	Int. for 3 months,	3.50	
			$203.50
	Balance due,		$331.50

(Art. 314, pp. 222–224.)

(2.)	Principal,		$625.50
	Int. to Jan. 1, 1865,		9.38
	Amount,		$634.88
	1st payment,		200.00
	New principal,		$434.88
	Int. to Jan. 1, 1866,		26.09
	Amount,		$460.97
	2d payment, less than int. due,	$20	
	3d payment,	300	
			320.00
	New principal,		$140.97
	Int. to May 1, 1866,		2.82
	Amount due May 1, 1866,		$143.79

(3.)	Principal,	$2400.00
	Int. for 1 y. at 7 %,	168.00
	Amount,	$2568.00
	Payment,	400.00
	New principal,	$2168.00
	Int. from Aug. 16, 1865, to Nov. 30, 1866,	195.60
	Amount,	$2363.60
	Payment,	67.89
	Balance due,	$2295.71

(4.)	Principal,	$5660.00
	Int. for 1 y. 1 m. 15 d.	318.37
	Amount,	$5978.37
	1st Payment,	578.33
	New principal,	$5400.04
	Int. from June 16, 1864, to June 16, 1866,	540.00
	Amount,	$5940.04
	Payments, $160 + $420,	580.00
	New principal,	$5360.04
	Int. from June 16, 1866, to Feb. 16, 1867,	178.67
	Balance due,	$5538.71

(Art. 315, p. 225.)

(1.)	Principal,		$1000.00
	Int. for 1 y.		60.00
	Amount,		$1060.00
	1st payment,	$100	
	Int. from Jan. 1, to July 1, 1865,	3	
			103.00
	New principal,		$957.00
	Int. from July 1, 1865, to Sept. 1, 1866,		66.99
	Amount,		$1023.99
	2d payment,		223.99
	New principal,		$800.00
	Int. from Sept. 1, 1866, to Jan. 1, 1867,		16.00
	Amount,		$816.00
	3d payment,		12.00
	Balance due Jan. 1, 1867,		$804.00

(ART. 316, pp. 224, 225.)

(1.)

Principal,		$5000
Int. to June 1, 1869, 1 y. 6 m.	$450	
1st payment,	400	
Balance of int.	$50	
Int. of prin. from June 1, to Dec. 1, 1869,	150	200
Amount,		$5200
2d payment,		2200
New principal,		$3000
Int. from Dec. 1, 1869, to June 1, 1870,		90
Amount due,		$3090

(2.)

Principal,			$1000.00
Int. on $1000 from Oct. 1, 1862, to Oct. 1, 1863,		$60.00	
Int. on $60 from Oct. 1, 1863, to Oct. 1, 1864,		3.60	
Int. on $1000 from Oct. 1, 1863, to Oct. 1, 1864,		60.00	
Unpaid interest,		$123.60	
1st payment,	$50.00		
Int. on $50,	1.50	51.50	
Balance of int. Oct. 1, 1864,		$72.10	
Int. on $72.10 from Oct. 1, 1864, to Oct. 1, 1865,		4.33	
Int. on $1000 from Oct. 1, 1864, to Oct. 1, 1865,		60.00	
Unpaid int. Oct. 1, 1865,			$136.43
Amount,			$1136.43
2d payment,		$400	
Int. on $400 for 4 mo.		8	
3d payment,		200	
Int. on $200 for 2 mo.		2	610.00
Balance due Oct. 1, 1865,			$526.43

COMPOUND INTEREST.

(Art. 318, p. 227.)

(2.)	Principal,	$100.00
	Int. for 1 year	6.00
	Amount, or 2d principal,	$106.00
	Int. for 2d year,	6.36
	Amount,	$112.36
	Int. for 3d year.	6.741
	Amount,	$119.101

(3.)	Principal,	$600.50
	Int. for 1st year,	30.025
	Amount, or 2d principal,	$630.525
	Int. for 2d year,	31.526
	Amount, or 3d principal,	$662.051
	1st principal,	600.50
	Compound interest,	$61.551

(4.)	Principal,	$300.00
	Int. for 1st year,	21.00
	Amount, or 2d principal,	$321.00
	Int. for 2d year,	22.47
	Amount, or 3d principal,	$343.47
	Int. for 3d year,	24.042
	Amount, or 4th principal,	$367.512
	Int for 4 m. 15 d.,	9.647
	Amount,	$377.159
	1st principal,	300.00
	Compound interest,	$77.159

(5.)	1st principal,	$860.00
	Int. for 6 months,	34.40
	Amount, or 2d principal,	$894.40
	Int. for 2d 6 months,	35.776
	Amount, or 3d principal,	$930.176
	Int. for 3d 6 months,	37.207
	Amount, or 4th principal,	$967.383
	Int. for 4th 6 months,	38.695
	Amount, or 5th principal,	$1006.078
	Int. for 5th 6 months,	40.243
	Amount, or 6th principal,	$1046.321
	Int. for 6th or last 6 months,	41.852
	Amount,	$1088.173

(6.)	1st principal,	$500.00
	Int. for 1st year,	25.00
	Amount, or 2d principal,	$525.00
	Int. for 2d year,	26.25
	Amount, or 3d principal,	$551.25
	Int. for 3d year,	27.562
	Amount, or 4th principal,	$578.812
	Int. for 4th year,	28.940
	Amount, or 5th principal,	$607.752
	Int. for 2 m. 15 d.,	6.33+
	Amount,	$614.08+

(Art. **319**, pp. **228**, **229**.)

(8.) Amount of $1 for 20 years at 2½ % = $1.638616;
$1.638616 × 100 = $163.86+, Ans.

(9.) Amount of $1 for 20 years = $3.869685;
Amount of $1 for 10 years = $1.967151;
$3.869685 × 1.967151 = $7.612254;
$7.612254 × 50 = $380.61+, Ans.

REVIEW EXERCISES.

(PAGE 229.)

(1.) $\$5400 \times .03 = \$162$;
$\$5400 + \$162 = \$5562$, Ans.

(2.) Time = 1 y. 5 m. 1 d.;
Int. of $\$1 = .085\frac{1}{6}$;
$\$250 \div .085\frac{1}{6} = \$2935.42+$, Ans.

(3.) At 1 % it will double itself in 100 years;
$100 \div 14\frac{2}{7} = 7$ %, Ans.

(4.) Int. of $250 for 1 year = $15;
$65 \div 15 = 4\frac{1}{3}$ years = 4 y. 4 m.;
July 15, 1866 — 4 y. 4 m. = March 15, 1862, Ans.

(5.) $\$800 \div 1.203 = \$665$, present worth;
$\$800 - 665 = \$135$, true discount;
Int. of $800 for 3. y. 4 m. 21 d. = bank discount = $162.80; $\$162.80 - \$135 = \$27.80+$, Ans.

(6.) Present worth of $220, due 2 years hence, at 6 % = $196.42+;
$\$200 - \$196.42 = \$3.58+$; therefore,
$200 cash in hand is the better offer by $3.58+.

(7.) 6 months after April 10, 1866 = Oct. 10, 1866 = time it is due; or, with 3 days of grace, Oct. 13.
Time from Aug. 11 to Oct. 13 = 63 days;
Int. of $500 for 63 days = $5.25;
$\$500 - \$5.25 = \$494.75$, proceeds.

(8.)

Compound interest =	$341.21
Annual interest =	340.08
Difference,	$1.13, Ans.

RATIO AND PROPORTION.

(Art. 325, p. 231.)

(3.)	Ans. 6 : 4	(9.)	Ans. 4.
(6.)	2 : $\frac{1}{2}$	(12.)	12.

(Art. 328, p. 232.)

(4.)	Ans. 11	(8.)	Ans. 200 qt., or 50 gal.

(Art. 330, pp. 234, 235.)

(2.) 12 : 30 : : $16 : $40, Ans.

(3.) 183 : 61 : : $273 : $91, Ans.

(4.) $56 : $16 : : 98 bu. : 28 bu., Ans.

(5.) $16 : $72 : : 12 yd. : 54 yd., Ans.

(6.) 5 : 45 : : 40 m. : 360 m., Ans.

(7.) 5 : 12$\frac{2}{5}$: : 6\frac{3}{8}$: $15.81, Ans.

(8.) $63 : $18 : : 385 kilos : 110 kilos., Ans.

(9.) 6 : 8 : : 32 days : 42$\frac{2}{3}$ days, Ans.

(10.) $200 : $300 : : 8 mo. : 12 mo., Ans.

(11.) 8 : 12 : : 100 men : 150 men, Ans.

(12.) $\frac{3}{4}$: $\frac{1}{2}$: : 12 yd. : 8 yd., Ans.

(13.) $\frac{4}{10}$: $\frac{1}{4}$: : $2 : $1.25, Ans.
Or, 4 : 25 : : $2.00 : $1.25, Ans.

(14.) $\frac{3}{16}$: $\frac{21}{26}$: : $9750 : $42000, Ans.

(15.) 15 : 34 : : 75 : 170, Ans.

(16.) 3 : 2 : : 210 : 140, Ans.

(17.) 3 cords, 5 c. ft. = 3.625 cords.
1 T. 5 cwt. 3 qr. = 1.2875 tons;
1.2875 : 1 : : 3.625 cords : 2 C. 6+ c. ft., **Ans.**

(18.) 150 : 225 : : $5\frac{1}{2}$ h. : 8 h. 15 m., **Ans.**

(19.) 8 + 2 : 8 : : 10 d. : 8 d., **Ans.**

(20.) 5 : 3 : : 14 oz. : $8\frac{2}{5}$ oz., **Ans.**

(21.) 7 ft. 6 in. = 90 in.; 9 ft. 2 in. = 110 in.;
110 : 90 : : 70400 times : 57600 times, **Ans.**

(22.) 4 A. 84 sq. rd. = 4.525 A.;
125 : 650 : : 4.525 A. : 23.53 A. = 23 A. 84.8 P., **Ans.**

(23.) 5 : 129 : : 7 ft. : 180.6 ft. = 180 ft. $7\frac{1}{5}$ in., **Ans.**

(24.) 7 : 3 : : 22400 : 9600;
22400 — 9600 = 12800, **Ans.**

(Art. 331, p. 236.)

(26.) 7 + 9 = 16;
16 : 7 : : 640 acres : 280 acres, **1st man's.**
16 : 9 : : 640 acres : 360 " **2d man's.**

(27.) $\frac{1}{2} + \frac{2}{3} + \frac{4}{5} = \frac{59}{30}$;

$$\left.\begin{array}{l} \frac{59}{30} : \frac{1}{2} :: 4720 : 1200; \\ \frac{59}{30} : \frac{2}{3} :: 4720 : 1600; \\ \frac{59}{30} : \frac{4}{5} :: 4720 : 1920, \end{array}\right\} \text{Ans.}$$

(28.) 13 + 12 = 25;
25 : 13 : : 4500 : 2340;
25 : 12 : 4500 : 2160, **Ans.**

(ART. **333**, pp. **236–238.**)

(2.)

$$\begin{array}{l} 6 : 12 \\ 4 : 9 \end{array} : : 16 \text{ acres} : 72 \text{ acres, Ans.}$$

(3.)

$$\begin{array}{l} 36 : 120 \\ 7 : 5 \end{array} : : \$98 : \$233\tfrac{1}{3}\text{, Ans.}$$

(4.)

$$\begin{array}{l} 10 : 6 \\ 16 : 40 \end{array} : : 4 \text{ days} : 6 \text{ days, Ans.}$$

(5.)

$$\begin{array}{l} 90 : 540 \\ 6 : 8 \end{array} : : 3 \text{ days} : 24 \text{ days, Ans}$$

(6.)

$$\begin{array}{l} 9 : 24 \\ 8 : 16 \end{array} : : \$600 : \$3200\text{, Ans.}$$

(7.)

$$\begin{array}{l} 11 : 33 \\ 18 : 5 \end{array} : : 12 \text{ horses} : 10 \text{ horses, Ans.}$$

(8.)

$$\begin{array}{r} 2000 : 6000 \\ 150 \times 4 = 600 : 150 \end{array} : : 3 \text{ months} : 2\tfrac{1}{4} \text{ months, Ans.}$$

(9.)

$$\begin{array}{l} 200 : 590 \\ 4 : 15 \end{array} : : \$4 : \$44.25\text{, Ans.}$$

(10.)

$$\begin{array}{l} 5 : 12 \\ \tfrac{2}{5} : 3 \end{array} : : \tfrac{3}{4} \text{ day} : 13\tfrac{1}{2} \text{ days, Ans.}$$

(11.)

$$\begin{array}{l} 12 : 5 \\ 100 : 160 \end{array} : : \$750 : \$500\text{, Ans.}$$

(12.)

$$\begin{array}{l} 30 : 60 \\ 64 : 24 : : 18 \text{ men} : 18 \text{ men, Ans.} \\ 6 : 8 \end{array}$$

(13.)

$$\begin{array}{l} 29 : 20 \\ 5 : 8\tfrac{19}{52} : : 32 \text{ acres} : 40 \text{ acres, Ans.} \\ 12 : 13 \end{array}$$

PARTNERSHIP.

(Art. **335**, pp. **239, 240.**)

(2.) $1500 + $1950 + $2100 = $5550;
A receives $\frac{1500}{5550}$, or $\frac{10}{37}$ of $1665 = $450.
B " $\frac{1950}{5550}$, or $\frac{13}{37}$ of $1665 = $585.
C " $\frac{2100}{5550}$, or $\frac{14}{37}$ of $1665 = $630.

(3.) $240 + $360 + $120 = $720;
A receives $\frac{240}{720}$, or $\frac{1}{3}$ of $350 = 116.66\frac{2}{3}$.
B " $\frac{360}{720}$, or $\frac{1}{2}$ of $350 = $175.
C " $\frac{120}{720}$, or $\frac{1}{6}$ of $350 = 58.33\frac{1}{3}$.

(4.) A's share = $\frac{48}{108}$, or $\frac{4}{9}$ of 45 = 20 tons.
B's " = $\frac{36}{108}$, or $\frac{1}{3}$ of 45 = 15 "
C's " = $\frac{24}{108}$, or $\frac{2}{9}$ of 45 = 10 "

(5.) A's share = $\frac{3}{5}$ of $2000 = $1200.
B's " = $\frac{2}{5}$ of $2000 = $800.
$1200 — $800 = $400 for A's services.

(Art. **336**, p. **240.**)

(6.) $8000 + $12000 = $20000;
A receives $\frac{8000}{20000}$, or $\frac{2}{5}$ of $6000 = $2400.
B " $\frac{12000}{20000}$, or $\frac{3}{5}$ of $6000 = $3600.

(7.) 21 + 17 + 47 = $85;
The first pays $\frac{21}{85}$ of $307 = $75.84+.
" second pays $\frac{17}{85}$, or $\frac{1}{5}$ of $307 = $61.40.
" third pays $\frac{47}{85}$ of $307 = $169.75+.

(8.) $5000 + $3000 + $2500 = $10500;
Wife's share = $\frac{5000}{10500}$, or $\frac{10}{21}$ of $7475 = $3559.52+.
Elder son's sh. = $\frac{3000}{10500}$, or $\frac{2}{7}$ of $7475 = $2135.71+.
Younger son's share = $\frac{2500}{10500}$, or $\frac{5}{21}$ of $7475 = $1779.76+.

(ART. **337**, pp. **241, 242.**)

(2.) A's \$6000 for 7 mo. = \$42000 for 1 mo.;
B's \$9000 “ 5 “ = 45000 “ “ “
C's \$1200 “ 4 “ = 48000 “ “ “
Entire stock, \$135000 “ “ “

A's share = $\frac{42000}{135000}$, or $\frac{14}{45}$ of \$4500 = \$1400.
B's “ = $\frac{45000}{135000}$, or $\frac{1}{3}$ of \$4500 = \$1500.
C's “ = $\frac{48000}{135000}$, or $\frac{16}{45}$ of \$4500 = \$1600.

(3.) A's \$500 for 18 mo. = \$9000 for 1 month;
B's \$380 “ 13 “ = 4940 “ “ “
C's \$270 “ 9 “ = 2430 “ “ “
Entire stock = \$16370 “ “ “

A's share = $\frac{9000}{16370}$, or $\frac{900}{1637}$ of \$818.50 = \$450.
B's “ = $\frac{4940}{16370}$ of \$818.50 = \$247.
C's “ = $\frac{2430}{16370}$ of \$818.50 = \$121.50.

(4.) 80 sheep for 6 mo. = 480 sheep for 1 month;
40 “ “ “ “ = 240 “ “ “ “
Jones's stock = 720 “ “ “ “

100 sheep for 6 mo. = 600 sheep for 1 month;
50 “ “ “ “ = 300 “ “ “ “
Smith's stock = 900 “ “ “ “

50 sheep for 6 mo. = 300 sheep for 1 month;
Hall's stock = 300 “ “ “ “

Entire stock = 720 + 900 + 300 sheep = 1920 sheep for 1 month.

Jones pays $\frac{720}{1920}$, or $\frac{3}{8}$ of \$275 = \$103.12$\frac{1}{2}$.
Smith “ $\frac{900}{1920}$, or $\frac{15}{32}$ of \$275 = \$128.90$\frac{5}{8}$.
Hall “ $\frac{300}{1920}$, or $\frac{5}{32}$ of \$275 = \$42.96$\frac{7}{8}$.

(5.) $500 for 12 mo. = $6000 for 1 month;
$150 " 7 " = 1050 " " "
A's stock = $7050 " " "

$600 for 9 mo. = $5400 for 1 month;
$400 " 3 " = 1200 " " "
B's stock = $6600 " " "

Entire stock = $7050 + $6600 = $13650.

A's share = $\frac{7050}{13650}$, or $\frac{47}{91}$ of $682.50 = $352.50.
B's " = $\frac{6600}{13650}$, or $\frac{44}{91}$ of $682.50 = $330.

(6.) A's $35000 for 2 mo. = $70000 for 1 month;
" 24000 " 3 " = 72000 " " "
" 20000 " 2 " = 40000 " " "
" entire stock = $182000 " " "

B's $11000 for 5 mo. = $55000 for 1 month.
C's $4000 for 2 mo. = $8000 for 1 month.

Entire stock = 182000 + 55000 + 8000 = $245000.

A's share = $\frac{182000}{245000}$, or $\frac{182}{245}$ of $9700 = $7205.71+.
B's " = $\frac{55000}{245000}$, or $\frac{55}{245}$ of $9700 = $2177.55+.
C's " = $\frac{8000}{245000}$, or $\frac{8}{245}$ of $9700 = $316.73+.

(7.) S's stock was in trade, 12 mo.;
T's = $\frac{1}{5}$ as much for 10 mo., or the same for $\frac{1}{5}$ of 10 mo., or 2 months;
Y's = $\frac{3}{4}$ as much as for 4 mo., or the same for $\frac{3}{4}$ of 4 mo., or 3 months;
12 mo. + 2 mo. + 3 mo. = 17 months.
S's share = $\frac{12}{17}$ of $3400 = $2400.
T's " = $\frac{2}{17}$ of $3400 = $400.
Y's " = $\frac{3}{17}$ of $3400 = $600.

EQUATION OF PAYMENTS.

(ART. **341**, p. **243**.)

(2.) 2 mo. × 500 = 1000 months;
5 " × 1000 = 5000 "
8 " × 1500 = 12000 "
3000) 18000 "
6 months, Ans.

(3.) 0 days × 1600 = 0 days;
90 " × 800 = 72000 "
2400) 72000
30 days, Ans.

(4.) 3 mo. × 40 = 120 months;
5 " × 60 = 300 "
10 " × 100 = 1000 "
200) 1420 "
$7\frac{1}{10}$ mo. = 7 months, 3 days.
March 1 + 7 mo. 3 days = Oct. 4, Ans.

(5.) 30 days × 200 = 6000
60 " × 150 = 9000
90 " × 300 = 27000
650) 42000
$64\frac{8}{13}$, reckoned 65 days.
May 16 + 65 days = July 20, Ans.

(ART. **342**, pp. **244**, **245**.)

(1.) Due Aug. 31, 0 days × 1000 = 0 days;
" Sept. 1, 1 " × 200 = 200 "
" " 19, 19 " × 600 = 11400 "
1800) 11600
6 days+.
Aug. 31 + 6 days = Sept. 6, Ans.

(3.) Due April 1, 0 mo. × 1400 = 0 months;
" May 1, 1 " × 500 = 500 "
" June 1, 2 " × 1100 = 2200 "
3000) 2700 "
$\frac{9}{10}$ mo. = 27 days. $\frac{9}{10}$ "
April 1 + 27 days = April 28, Ans.

(4.) Due Jan. 1, 0 days × 735 = 0 days;
" Feb. 20, 50 " × 650 = 32500 "
" " 1, 31 " × 100 = 3100 "
" April 11, 100 " × 200 = 20000 "
1685) 55600 "
33 days nearly
Jan. 1 + 33 days = Feb. 3, Ans.

(Art. **343**, p. **245**.)

(5.) Due April 1, 0 days × 1450 = 0 days;
" May 7, 36 " × 1250 = 45000 "
" June 5, 65 " × 850 = 55251 "
3550) 100251 "
28 "
April 1 + 28 days = April 29, the average date;
April 29 + 4 mo. = Aug. 29 = equated time, Ans.

(6.) Due Jan. 15, 0 days × 3750 = 0 days;
" Feb. 10, 26 " × 3000 = 78000 "
" Mar. 6, 50 " × 2400 = 120000 "
" June 8, 144 " × 2250 = 324000 "
11400) 522000 "
46 days nearly.
Jan. 15 + 46 days = Mar. 2 = average date;
Mar. 2 + 6 mo. = Sept. 2 = equated time, Ans.

AVERAGING ACCOUNTS.

(Art. **346**, p. **247**.)

(2.) Due July 30, 0 days × 550 = 0 days;
“ Aug. 14, 15 “ × 850 = 12750 “
1400 12750 “
Due July 31, 1 day × 400 = 400 days;
“ Aug. 4, 5 “ × 300 = 1500 “
700 1900 “
$1400 — $700 = $700 balance;
12750 — 1900 = 10650 days;
10850 ÷ 700 = 16 days nearly.
July 30 + 16 days = Aug. 15, time due, Ans.

(3.) Due Nov. 3, 0 days × 500 = 0 days;
“ Dec. 23, 50 “ × 600 = 30000 “
1100 30000 “
Due Nov. 13, 10 days × 700 = 7000 days;
1100 — 700 = 400;
30000 — 7000 = 23000 days;
23000 ÷ 400 = 58 days nearly.
Nov. 3 + 58 days = Dec. 31, 1866, Ans.

(4.) Due July 15, 26 days × 300 = 7800 days;
“ Aug. 2, 44 “ × 50 = 2200 “
“ July 31, 42 “ × 150 = 6300 “
500 16300 “
Due June 19, 0 days × 200 = 0 days;
“ Sept. 17, 90 “ × 200 = 18000 “
400 18000 “
300 + 49.60 + 150 = 499.60 — 400 = $99.60, face of the note;
18000 — 16300 = 1700 days;
1700 ÷ 100 = 17 days.
June 19 — 17 days = June 2, Ans.

INTEREST METHOD.

(Art. 352, p. 249.)

(4.) Int. on $600 for 62 days = $7.23+.
" " 200 " 0 " = 0
$800 $7.23
7.23
$807.23

Int. on $700 for 121 days = $16.46+;
$700 + $16.46 = $716.46;
$807.23 — $716.46 = $90.77, Ans.

(5.) Int. on $300 for 48 days = $2.40
" " 50 " 30 " = .25
" " 150 " 32 " = .80
$500 $3.45

Int. on $300 for 64 days = $3.20
" " 200 " 16 " = .53
$500 " $2.67

$3.45 — $2.67 = $.78, Ans.

CUSTOMS.

(Art. 364, p. 253.)

(2.) $5600 × .30 = $1680, Ans.

(3.) 200 × 25 = 5000 kilos.;
5000 × 2.2046 = 11023 lb.;
11023 × .02 = 220.46 lb.;
11023 — 220.46 = 10802.54 lb.;
10802.54 × .05 = $540.127, Ans.

(4.) $6000 \times .09 = 540$;
$6000 - 540 = 5460$;
$5460 \times .20 = \$1092$, Ans.

(5.) $2240 \times 5 = 11200$ lb.;
$11200 \times .22 = \$2464$;
$\$2464 \times .20 = \$492.80$, **Ans.**

STOCKS.

(Art. **368**, p. **254**.)

(1.) $110 + \frac{1}{4} = 110\frac{1}{4}$ %; $\$5000 \times 1.10\frac{1}{4} = \$5512.50$.

(2.) $110 + \frac{1}{4} = 110\frac{1}{4}$ %; $\$5512.50 \div 1.10\frac{1}{4} = \$5000$.

(3.) $\$100 \times .91 = \$91$; $\$5460 \div \$91 = 60$.

(4.) $\$20000 \times .05 = \$1000$; $\$1000 \times 1.05\frac{3}{4} = \$1057.50$.

(5.) $\$100 \times .06 = \$6$; $\frac{6}{8}$ of 100 % $= 7\frac{1}{2}$ %.

(6.) At 100 it pays 10 %; hence, to pay 8 %, it must be bought at $\frac{10}{8}$ of 100, or at 125.

(8.) \$600 semi-annually = \$1200 annually. $\$1200 \div .08 = \$15000$. $\$15000 \times 1.12 = \$16800$.

DOMESTIC OR INLAND EXCHANGE.

(Art. **377**, p. **257**.)

(3.) $\$500 \times .99\frac{1}{2} = \$497.50$.
Int. of $500 for 63 days at 7 % = $6.125.
$\$497.50 - \$6.125 = \$491.37\frac{1}{2}$, Ans.

(4.) $\$1940 \times 1.01\frac{1}{4} = \$1964.25$, Ans.

(5.) $\$920 \times .99\frac{3}{4} = \$917.70$.
Int. of $920 for 93 days at 8 % = $19.01.
$\$917.70 - \$19.01 = \$898.69$, Ans.

(6.) $\$3000 \times 1.01 = \$3030$.
Int. of $3000 for 2 mo. 3 days = $31.50.
$\$3030 - \$31.50 = \$2998.50$, Ans.

(Art. **378**, pp. **257**, **258**.)

(2.) $\$6075 \div \$1.0125 = \$6000$, Ans.

(3.) $\$1.00 - .02 = \$.98$.
Int. of $1 for 33 days = $.0055.
$\$.98 - \$.0055 = \$.9745$;
$\$19490 \div \$.9745 = \$20000$, Ans

FOREIGN EXCHANGE.

(Art. **384**, p. **260**.)

(2.) £1 = $4.80
£2200 = $\$4.80 \times 2200$
= $10560, Ans.

(3.) $\pounds 1 = \$4.82\frac{1}{4} = \$4.8225$;
$\pounds 1173.25 = \$4.8225 \times 1173.25$
$= \$5658$, Ans.

(5.) 1 florin $= \$.40 \times 1.01 = \$.404$;
2626 florins $= \$.404 \times 2626 = \$1060.90+$, Ans.

(7.) $\$500 \times 5.14 = 2570$ francs, Ans.

(8.) $\pounds = \$4.82\frac{1}{4} = \$4.8225$;
$\$5658 \div \$4.8225 = \pounds 1173.25 +$
$= \pounds 1173\ 5$ s.

REVIEW EXERCISES.

(PAGES 261, 262.)

(1.) 6 weeks = 42 days;
$42 : 3 = 14$, Ans.

(2.) $8 : 72 = \frac{8}{72} = \frac{1}{9}$, Ans.

(3.) $31.65 \div 2.11 = 15$, Ans.

(4.) $2.11 \times 15 = 31.65$, Ans.

(5.) $2\frac{2}{3} \div \frac{3}{5} = \frac{40}{9} = 4\frac{4}{9}$, Ans,

(6.) $9 : 10 = \frac{9}{10}$; $3 : 4 = \frac{3}{4}$;
$\frac{9}{10} = \frac{18}{20}$; $\frac{3}{4} = \frac{15}{20}$. Therefore, $9 : 10$ is the greater.

(7.) $(2 \times 5 \times 1) = 10 : (3 \times 7 \times 7) = 147$;
$10 : 147$, Ans.

(8.) $155 \times 5 = 775$ miles, Ans.
Or, 12 : 60 : : 155 miles : 775 miles, Ans.

(9.) 803 : 73 : : 22 days : 2 days, Ans.

(10.) The hound gains 2 leaps in making 27 leaps. Therefore he will make as many times 27 leaps as 2 is found times in $50 = 25$;
And 25 times $27 = 675$, Ans.
Or, as 2 : 50 : : 27 : 675, Ans.

(11.) $\$3000 + \$2000 + \$1000 = \$6000$;
$\$6000 \times .12\frac{1}{2} = \$750$.

A's share $= \frac{3000}{6000}$ or $\frac{1}{2}$ of $\$750 = \$375$.
B's " $= \frac{2000}{6000}$ or $\frac{1}{3}$ of $\$750 = \$250$.
C's " $= \frac{1000}{6000}$ or $\frac{1}{6}$ of $\$750 = \$125$.

(12.) $9 + 7 + 6 + 5 = 27$ letters.
Hendricks' share $= \frac{9}{27}$ or $\frac{1}{3}$ of $\$54000 = \$18000$.
William's " $= \frac{7}{27}$ of $\$54000 = \$14000$.
Arthur's " $= \frac{6}{27}$ of $\$54000 = \$12000$.
Frank's " $= \frac{5}{27}$ of $\$54000 = \$10000$.

(13.)
$$\left.\begin{array}{l} 3\frac{1}{2} : 9\frac{3}{4} \\ \frac{3}{4} : \frac{7}{8} \end{array}\right. : : \$7\tfrac{5}{8} : \$24.78+, \text{ Ans.}$$

(14.)
$$\begin{array}{r} 9000 \times 12 = 108000 \\ 10000 \times 9 = \underline{90000} \\ 198000 \end{array}$$

A's share $= \frac{108000}{198000}$ or $\frac{6}{11}$ of $\$1320 = \$720$.
B's " $= \frac{90000}{198000}$ or $\frac{5}{11}$ of $\$1320 = \$600$.

(15.)

$$\begin{array}{rcrcr} 4 & \times & 500 & = & 2000 \\ 8 & \times & 1000 & = & 8000 \\ 16 & \times & \underline{1500} & = & \underline{24000} \\ & & 3000) & & \underline{34000} \\ & & & & 11\frac{1}{3}\text{ months.} \end{array}$$

$11\frac{1}{3}$ months = 11 mo. 10 days, Ans.

(16.)

$$\begin{array}{lr} \text{Int. of } \$400 \text{ for } 231 \text{ days} = & \$15.40 \\ \text{`` `` } \underline{1000} \text{ `` } 60 \text{ `` } = & \underline{10.00} \\ \qquad \$1400 & \$25.40 \end{array}$$

\$1400 + \$25.40 = \$1425.40.

$$\begin{array}{lr} \text{Int. of } \$800 \text{ for } 273 \text{ days} = & \$36.40 \\ \text{`` `` } \underline{900} \text{ `` } 123 \text{ `` } = & \underline{18.45} \\ \qquad \$1700 & \$54.85 \end{array}$$

\$1700 + \$54.85 = \$1754.85;
\$1754.85 — \$1425.40 = \$329.45, Ans.

(17.) \$1500 ÷ 75000 = .02;
\$1200 × .02 = \$24, Ans.

(18.) 15 shillings = $\frac{3}{4}$ of a £;
$\frac{3}{4}$ of \$4.84 = \$3.63, cost of 1 yard in United States money.
\$3.63 × 500 = \$1815;
\$1815 × .30 = \$544.50, Ans.

(19.) £ = \$4.86$\frac{1}{2}$ = \$4.865;
\$2182.20 ÷ \$4.865 = £448.55 +
= £448 11 s, Ans.

EXERCISES IN ANALYSIS.

(PAGES 262–266.)

(2.) $735 ÷ 7 = $105, Ans.

(3.) B's share = $\frac{1}{7}$ of $1974 = $282.
A's " = $\frac{6}{7}$ of $1974 = $1692.

(5.) $60200 — $35000 = $25200.
A's share = $\frac{1}{8}$ of $25200 = $3150;
B's " = $\frac{2}{8}$ of $25200 = $6300;
C's " = $\frac{5}{8}$ of $25200 = $15750.

(6.) $\frac{1}{4} = \frac{3}{12}$; $\frac{1}{3} = \frac{4}{12}$; $\frac{1}{6} = \frac{2}{12}$; rem. $= \frac{3}{12}$.
$\frac{3}{12} \times 2 = \frac{6}{12}$;
$\frac{4}{12} \times 4 = \frac{16}{12}$;
$\frac{2}{12} \times 5 = \frac{10}{12}$;
$\frac{3}{12} \times 6 = \frac{18}{12}$;
$\frac{6}{12} + \frac{16}{12} + \frac{10}{12} + \frac{18}{12} = \frac{50}{12}$;
$\frac{50}{12} \div \frac{12}{12} = 4\frac{1}{6}$ mo. = 4 mo. 5 days, Ans.

(8.) March 5, 1866, + 6 mo. = Sept. 5, 1866.

$$\begin{array}{lcrcrl} 5 \text{ mo.} & \times & 200 & = & 1000 & \text{mo.;} \\ 1 \text{ "} & \times & \underline{800} & = & \underline{800} & \text{"} \\ & & 1000 & & 1800 & \text{"} \end{array}$$

$1600 — $1000 = $600;
$1800 ÷ 600 = 3 months;
Sept. 5 + 3 mo. = Dec. 5, 1866, Ans.

(9.) 4 mo. × 1500 = 6000 months;
$2500 — $1500 = $1000;
6000 ÷ 1000 = 6 months, Ans.

(11.) $19 - 16 = 3$; $51 \div 3 = 17$;
$19 \times 17 = 323$ miles, Ans.

(12.) $2\frac{1}{4}$ miles $\times\ 2 = 4\frac{1}{2}$ miles A travels before B starts.
9 miles — $2\frac{1}{4}$ miles $= 6\frac{3}{4}$ miles B gains in 1 hour;
$4\frac{1}{2} \div 6\frac{3}{4} = \frac{2}{3}$ hour $= 40$ minutes $=$ the time B will overtake A.
$\frac{2}{3}$ of 9 miles $= 6$ miles, distance from Boston.

(14.) If 112 sheep are worth 90 colts, 9 colts, or 10 calves $= \frac{1}{10}$ of 112 sheep, 50 calves $= \frac{5}{10}$ of 112 sheep $= 56$ sheep, Ans.

(15.) If 2 women can do the work of 3 boys, 1 woman can do $\frac{1}{2}$ as much as 3 boys, 32 women, or 8 men, can do $\frac{32}{2}$, or 16 times the work of 3 boys, or the work of 48 boys, $\frac{1}{2}$ of 8 men would do the work of 24 boys $= 4$ men, Ans.

(16.) 1 cord of spruce $= \frac{1}{2}$ a cord of oak;
1 " " pine $= \frac{8}{7}$ of $\frac{1}{2}$ a cord of oak $= \frac{8}{14}$;
$\frac{1}{2} + \frac{8}{14} = \frac{15}{14}$.
Therefore, 2 cords of spruce and pine in equal parts $= \frac{15}{14}$ cords of oak.
1 cord $= \frac{1}{2}$ of $\frac{15}{14} = \frac{15}{28}$; $60 \div \frac{15}{28} = 112$ cords, Ans.

(18.) 1 man will do the work in 2 times $11\frac{1}{2}$ hours $=$ 23 hours;
1 woman, in 5 times $11\frac{1}{2} = 57\frac{1}{2}$ hours;
1 boy, " 12 " $11\frac{1}{2} = 138$ "
In one hour a man do $\frac{1}{23}$;
A woman, $\frac{1}{57\frac{1}{2}} = \frac{2}{115}$; $\frac{2}{115} \times 2 = \frac{4}{115}$;
A boy, $\frac{1}{138} = \frac{1}{138}$; $\frac{1}{138} \times 3 = \frac{1}{46}$.
$\frac{1}{23} + \frac{4}{115} + \frac{1}{46} = \frac{23}{230}$; $\frac{230}{230} \div \frac{23}{230} = 10$ hours, Ans

(19.) The carpenter will do $\frac{1}{12\frac{1}{2}}$, or $\frac{2}{25}$ in one day $= \frac{6}{75}$;
" journeyman " " $\frac{1}{18\frac{3}{4}}$, or $\frac{4}{75}$ " " " $= \frac{4}{75}$;
" apprentice " " $\frac{1}{25}$ " " " $= \frac{3}{75}$;
$\frac{6}{75} + \frac{4}{75} + \frac{3}{75} = \frac{13}{75}$; $\frac{75}{75} \div \frac{13}{75} = 5\frac{10}{13}$ days, the time they will do it together.

The carpenter performs $\frac{6}{13}$ of what they all do in one day; hence,

Carpenter will receive $\frac{6}{13}$ of \$325 = \$150.
Journeyman " " $\frac{4}{13}$ " \$325 = \$100.
Apprentice " " $\frac{3}{13}$ " \$325 = \$75.

EVOLUTION.

(Art. 393, p. 272.)

(4.)

$$\begin{array}{rl|l}
 & \dot{7}7\dot{8}4\dot{1} & 279,\ \text{Ans.} \\
40 & 4 & \\
\cline{2-3}
\underline{7} & 378 & \\
47 \times 7 = & \underline{329} & \\
540 & 4941 & \\
\underline{9} & & \\
539 \times 9 = & \underline{4941} &
\end{array}$$

(5.)

$$\begin{array}{rl|l}
 & 2\dot{9}1\dot{6} & 54,\ \text{Ans.} \\
100 & 25 & \\
\cline{2-3}
\underline{4} & 416 & \\
104 \times 4 = & \underline{416} &
\end{array}$$

(6.)

$$
\begin{array}{lr|l}
 & 1\dot{0}.4\dot{9}7\dot{6} & 3.24,\ \textbf{Ans.} \\
60 & 9 & \\
\underline{\ \ 2} & 149 & \\
62 \times 2 = & \underline{124} & \\
640 & 2576 & \\
\underline{\ \ 4} & & \\
644 \times 4 = & \underline{2576} &
\end{array}
$$

(7.)

$$
\begin{array}{lr|l}
 & \dot{1}1\dot{6}6\dot{4} & 108,\ \textbf{Ans.} \\
200 & 1 & \\
\underline{\ \ 8} & 1664 & \\
208 \times 8 = & \underline{1664} &
\end{array}
$$

(8.)

$$
\begin{array}{lr|l}
 & .4\dot{5}9\dot{6}8\dot{4} & .678,\ \textbf{Ans.} \\
120 & 36 & \\
\underline{\ \ 7} & 996 & \\
127 \times 7 = & \underline{889} & \\
1340 & 10784 & \\
\underline{\ \ 8} & & \\
1348 \times 8 = & \underline{10784} &
\end{array}
$$

(9.)

$$
\begin{array}{lr|l}
 & 3\dot{1}6\dot{4}0\dot{6}2\dot{5} & 5625,\ \textbf{Ans.} \\
100 & 25 & \\
\underline{\ \ 6} & 664 & \\
106 \times 6 = & \underline{636} & \\
1120 & 2806 & \\
\underline{\ \ 2} & & \\
1122 \times 2 = & \underline{2244} & \\
11240 & 56225 & \\
\underline{\ \ 5} & & \\
11245 \times 5 = & \underline{56225} &
\end{array}
$$

(10.) $.0\dot{0}0\dot{3}2\dot{7}2\dot{4}8\dot{1}$ | .01809, **Ans.**

20 | 1

8 | 227

28 × 8 = | 224

3600 | 32481

9

3609 × 9 = | 32481

(11.) $.0\dot{0}0\dot{0}1\dot{8}4\dot{9}$ | .0043, **Ans.**

80 | 16

3 | 249

83 × 3 = | 249

(Art. 394, pp. 272, 273.)

(12.) $1\dot{2}.0\dot{0}0\dot{0}0\dot{0}$ | 3.464+, **Ans**

60 | 9

4 | 300

64 × 4 = | 256

680 | 4400

6

686 × 6 = | 4116

6920 | 28400

4

6924 × 4 = | 27696

(13.) $\dot{1}.6\dot{0}$ | 1.26+, **Ans.**

20 | 1

2 | 60

22 × 2 = | 44

240 | 1600

6

246 × 6 = | 1476

(14.)

$$\begin{array}{l|l} & .0\dot{0}2\dot{0}\ \big|\ .0447+,\ \text{Ans.} \\ 80 & \underline{16} \\ \underline{\ \ 4} & 400 \\ 84 \times 4 = & \underline{336} \\ 880 & 6400 \\ \underline{\ \ 7} & \\ 887 \times 7 = & \underline{6009} \end{array}$$

(15.)

$$\begin{array}{l|l} & \dot{5}.0\dot{0}\ \big|\ 2.236+,\ \text{Ans.} \\ 40 & \underline{4} \\ \underline{\ \ 2} & 100 \\ 42 \times 2 = & \underline{84} \\ 440 & 1600 \\ \underline{\ \ 3} & \\ 443 \times 3 = & \underline{1329} \\ 4460 & 27100 \\ \underline{\ \ \ 6} & \\ 4466 \times 6 = & \underline{26796} \end{array}$$

(16.)

$$\begin{array}{l|l} & .5\dot{0}0\dot{0}\ \big|\ .7071+,\ \text{Ans.} \\ 1400 & \underline{49} \\ \underline{\ \ \ 7} & 10000 \\ 1407 \times 7 = & \underline{9849} \\ 14140 & 15100 \\ \underline{\ \ \ \ 1} & \\ 14141 \times 1 = & \underline{14141} \end{array}$$

(Art. 395, p. 273.)

(17.) $\sqrt{121} = 11$: $\sqrt{169} = 13$; $\frac{11}{13}$, Ans.

(18.) $\frac{7056}{9216} = \frac{49}{64}$;
$\sqrt{49} = 7$; $\sqrt{64} = 8$; $\frac{7}{8}$, Ans.

(19.) $\frac{450}{2048} = \frac{225}{1024}$;
$\sqrt{225} = 15$; $\sqrt{1024} = 32$; $\frac{15}{32}$, Ans.

(20.) $37\frac{36}{49} = \frac{1849}{49}$;
$\sqrt{1849} = 43$; $\sqrt{49} = 7$; $\frac{43}{7} = 6\frac{1}{7}$, Ans.

(21.) $\frac{7}{8} = .875$.
$\sqrt{.875} = .9354+$, Ans.

(22.) $\sqrt{17.23} = 4.1509+$, Ans.

(23.)
$$\begin{array}{rr|l} & \dot{4}2\dot{0}2\dot{5} & 205, \text{ Ans.} \\ 400 & 4 & \\ \underline{5} & 2025 & \\ 405 \times 5 = & 2025 & \end{array}$$

(24.) $\sqrt{\frac{478}{549}} = \sqrt{.8706739526+} = .9330\dot{9}+$, Ans.

APPLICATIONS.

(PAGES 273, 274.)

(1.) $\sqrt{3.61} = 19$. Ans.

(2.) $\sqrt{20736} = 144$, Ans.

(3.) $\sqrt{3969} = 63$, Ans.

(4.) $\sqrt{141376} = 376$, Ans.

(5.) 1 acre = 160 sq. rods.
$\sqrt{160} = 12.64+$ rods, Ans.

(6.) 10 acres = 1600 sq. rd.;
$\sqrt{1600} = 40$, the length of one side;
$40 \times 4 = 160 \times .60 =$ \$96, Ans.

(7.) 1 hectare = 10000 meters;
$\sqrt{10000} = 100$ meters, length of 1 side;
4 sides = 4 times 100 meters = 400;
$400 \times .25 =$ \$100, Ans.

(8.) $15410 - 34 = 15376$;
$\sqrt{15376} = 124$, Ans.

CUBE ROOT.

(Art. 398, p. 278.)

(3.)

$$\begin{array}{rl} & \dot{5}487\dot{2}\,|\,38, \text{ Ans.} \\ 2700 & 27 \\ 720 & \overline{27872} \\ \underline{64} & \\ 3484 \times 8 = & \underline{27872} \end{array}$$

(4.)

$$\begin{array}{rl} & 63\dot{6}05\dot{6}\,|\,86, \text{ Ans.} \\ 19200 & 512 \\ 1440 & \overline{124056} \\ \underline{36} & \\ 20676 \times 6 = & \underline{124056} \end{array}$$

(5.)

	$6\dot{4}96\dot{4}80\dot{8}$ | 402, Ans.
480000	64
2400	964808
4	
482404 × 2 =	964808

(6.)

	$44\dot{4}19\dot{4}.94\dot{7}$ | 76.3, Ans.
14700	343
1260	101194
36	
15996 × 6 =	95976
1732800	5218947
6840	
9	
1739649 × 3 =	5218947

(7.)

	$.00\dot{0}00\dot{1}72\dot{8}$ | .012, Ans.
300	1
60	728
4	
364 × 2 =	728

(8.)

	$.00\dot{1}90\dot{6}62\dot{4}$ | .124, Ans.
300	1
60	906
4	
364 × 2 =	728
43200	178624
1440	
16	
44656 × 4 =	178624

(9.)		$\dot{1}07\dot{6}89\dot{0}62\dot{5}$ | 1025, Ans.
	30000	1
	600	76890
	4	
	30604 × 2 =	61208
	3121200	15682625
	15300	
	25	
	3136525 × 5 =	15682625
(10.)		$8\dot{0}.67\dot{7}56\dot{8}16\dot{1}$ | 4.321, Ans.
	4800	64
	360	16677
	9	
	5169 × 3 =	15507
	554700	1170568
	2580	
	4	
	557284 × 2 =	1114568
	55987200	56000161
	12960	
	1	
	56000161 × 1 =	56000161

(Art. 399, pp. 278, 279.)

(11.)		$2\dot{6}.20\dot{0}$ | 2.97+, Ans.
	1200	8
	540	18200
	81	
	1821 × 9 =	16389
	252300	1811000
	6090	
	49	
	258439 × 7 =	1809073

(12.)

	2.000	1.259+, **Ans.**
300	1	
60	1000	
4		
364 × 2 =	728	
43200	272000	
1800		
25		
45025 × 5 =	225125	
4687500	46875000	
33750		
81		
4721331 × 9 =	42491979	

(13.)

	517.000	8.025+, **Ans**
1920000	512	
4800	5000000	
4		
1924804 × 2 =	3849608	
192961200	1151392000	
120300		
25		
193081525 × 5 =	965407625	

(Art. **400**, p. **279.**)

(14.) $\frac{189}{875} = \frac{27}{125}$;
$\sqrt[3]{27} = 3$; $\sqrt[3]{125} = 5$. **Ans.**, $\frac{3}{5}$.

(15.) $\frac{4}{9} = 444444444+$;
$\sqrt[3]{444444444} = .763+$, **Ans.**

(16.) $\frac{136}{12393} = \frac{8}{729}$;
$\sqrt[3]{8} = 2$; $\sqrt[3]{729} = 9$. Ans., $\frac{2}{9}$.

(17.) $\frac{6}{7} = .857142857+$;
$\sqrt[3]{857142857} = .949+$, Ans.

(18.) $30\frac{265}{512} = \frac{15625}{512}$;
$\sqrt[3]{15625} = 25$; $\sqrt[3]{512} = 8$; $\frac{25}{8} = 3\frac{1}{8}$, Ans.

(19.) $7\frac{3}{5} = 7.6$;
$\sqrt[3]{7.6} = 1.966+$, Ans.

(20.) $405\frac{28}{125} = \frac{50653}{125}$;
$\sqrt[3]{50653} = 37$; $\sqrt[3]{125} = 5$; $\frac{37}{5} = 7\frac{2}{5}$, Ans.

(21.)

```
                         15.320|2.483+, Ans.
1200                      8    |
 240                    |7320
  16                    |
1456 × 4 =              |5824
172800                  |1496000
  5760                  |
    64                  |
178624 × 8 =            |1428992
18451200                  |67008000
    22320                 |
        9                 |
18473529 × 3 =            |55420587
```

(PAGE 279.)

(1.) $\sqrt[3]{103823} = 47$ in., Ans.

(2.) $\sqrt[3]{2150.42} = 12.9+$, in., Ans.

(3.) $21\frac{1}{3} \times 6 \times 4 = 512$ cu. ft.;

$\sqrt[3]{512} = 8$ ft., Ans.

(4.) 474552 liters $= 474.552$ cu. meters;

$\sqrt[3]{474.552} = 7.8$ meters;

$(7.8)^2 = 60.84$ sq. meters = area of 1 side, Ans.

(5.) $\sqrt[3]{1331} = 11$ ft., Ans.

(6.) $576 \times 231 = 133056$ cu. in.;

$133056 \div 1728 = 77$ cu. ft.;

$\sqrt[3]{77} = 4.25+$, Ans.

MENSURATION.

(Art. 411, p. 283.)

(3.) $15^2 = 225$;

$20^2 = 400$;

$225 + 400 = 625$;

$\sqrt{625} = 25$ ft., Ans.

(4.) $60^2 = 3600$;

$80^2 = 6400$;

$3600 + 6400 = 10000$;

$\sqrt{10000} = 100$ miles, Ans.

(5.) $36^2 = 1296$;

$24^2 = 576$;

$1296 - 576 = 720$ meters;

$\sqrt{720} = 26.83+$ meters, Ans.

(6.) $30^2 = 900$;
$40^2 = 1600$;
$1600 + 900 = 2500$;
$\sqrt{2500} = 50$ ft.;
30 ft. + 50 ft. = 80 ft. hight of the tree, Ans.

(7.) $25^2 = 625$;
$15^2 = 225$;
$625 - 225 = 400$;
$\sqrt{400} = 20$; $20 \times 2 = 40$ ft., width of house, Ans.

(ART. 416, p. 286.)

(1.) $18.8 \times 2.7 = 50.76$ sq. ft., Ans.

(2.) 15 in. = $2\frac{1}{4}$ ft.;
$28 \times 2\frac{1}{4} = 35$ ft., Ans.

(3.) $40 \div 2 = 20$ ft.;
$20 \times 20 = 400$ sq. ft., Ans.

(4.) $32 \div 2 = 16$;
$16 \times 14 = 224$ sq. rd. = 1 A. 64 sq. rd., Ans.

(5.) $75 + 33 = 108$;
$108 \div 2 = 54$;
$54 \times 20 = 1080$ sq. yd. =
$1080 \div 30\frac{1}{4} = 35.7+$ sq. rd., Ans.

(6.) $640 \times 240 = 153600$ sq. meters;
$153600 \div 10000 = 15.36$ hectares =
15 hectares, 36 ares, Ans.

(7.) $160 \div 2 = 80$;
$50 \times 80 = 4000$;
$70 \times 80 = 5600$;
$4000 + 5600 = 9600$ sq. rd. = 60 A., Ans.

(Art. 417, p. 286.)

(8.) $13 + 84 + 85 = 182$;
$182 \div 2 = 91$;
$91 - 13 = 78$;
$91 - 84 = 7$;
$91 - 85 = 6$;
$91 \times 78 \times 7 \times 6 = 298116$ rd.;
$\sqrt{298116} = 546$ sq. rd. $=$ 3 A. 66 sq. rd., Ans.

(9.) $30 + 35 + 45 = 110$;
$110 \div 2 = 55$;
$55 - 30 = 25$;
$55 - 35 = 20$;
$55 - 45 = 10$;
$55 \times 25 \times 20 \times 10 = 275000$ rd.;
$\sqrt{275000} = 524.4$, area of one triangle.

$25 + 45 + 40 = 110$;
$110 \div 2 = 55$;
$55 - 25 = 30$;
$55 - 45 = 10$;
$55 - 40 = 15$;
$55 \times 30 \times 10 \times 15 = 497.4$, area of other triangle.
$524.4 + 497.4 = 1021.8$ sq. rd.;
$1021.8 \div 160 =$ 6 A. 61.8 sq. rd., Ans.

(10.) $14.6 \times 6 = 87.6$ ft.;
$12.64 \div 2 = 6.32$ ft.;
$87.6 \times 6.32 = 553.63+$ sq. ft., Ans.

(Art. 420, pp. 288, 289.)

(1.) $20 \times 3.1416 = 62.83+$ ft., Ans.

(2.) $142 \div 3.1416 = 45.19$ yd., Ans.

(3.) $100^2 = 10000$;
$10000 \times .7854 = 7854$ sq. yd., Ans.

(4.) $24^2 = 576$; $576 \div 2 = 288$;
$\sqrt{288} = 16.97$ in., Ans.

(5.) $5 \times 3.1416 = 15.7+$ ft., Ans.

(6.) 5 A. 146 sq. rd. = 946 sq. rd.;
$946 \div .7854 = 1204.48+$ sq. rd.;
$\sqrt{1204.48} = 34.7+$ rd., Ans.

(7.) $50^2 = 2500$; $2500 \times .7854 = 1963.5$ sq. meters
= 19 ares, 63.5 centiares, Ans.

(8.) $50 \times .8862 = 44.31$ ft., Ans.

(9.) 1 A. = 160 sq. rd.;
$160 \div .7854 = 203.71+$ sq. rd.;
$\sqrt{203.71} = 14.27+$ rd., diameter of the circle;
$1427 \div 2 = 7.136+$ rd., length of tether, Ans.

(10.) $300 \times .2251 = 67.53+$ in., Ans.

(11.) 2 A. = 320 sq. rd.;
$320 \div .7854 = 471.09$ sq. rd.;
$\sqrt{471.09} = 21.7$ rd. $\div 2 = 10.8+$ rd., Ans.

(Art. 423, p. 290.)

(2.) $4 \times 3.1416 = 12.5664$;
$12.5664 \times 10 = 125.66+$ sq. ft., Ans.

(3.) $90^2 = 8100$;
$8100 \times .7854 = 6361.74$ sq. centimeters = .636174 sq. meters;
$.636174 + 10 = 6.36174$ cubic meters, Ans.

(4.) $2+2+2=6$; $6\div 2=3$;
$3-2=1$;
$3-2=1$;
$3-2=1$;
$3\times 1\times 1\times 1=3$;
$\sqrt{3}=1.73+$;
$1.73\times 14=24.22+$ in., Ans.

(5.) 1 ft. 5 in. × 17 in.;
$17\times 6\frac{1}{2}=110\frac{1}{2}$ sq. in. $=\frac{110\frac{1}{2}}{144}$ ft.;
$\frac{110\frac{1}{2}}{144}\times 22\frac{7}{12}=17.329$ cu. ft., Ans.

(Art. 427, pp. 292, 293.)

(1.) $3\times 4=12$;
$24.05\div 2=12.025$;
$12\times 12.025=144.3$, convex surface.
$3\times 3=9=$ end surface.
$144.3+9=153.3$, entire surface, Ans.

(2.) $20\div 2=10$; $60\times 10=600$ sq. ft. $=66\frac{2}{3}$ sq. yd., Ans.

(3.) $15\times 3=45\div 2=22\frac{1}{2}$;
$22\frac{1}{2}-15=7\frac{1}{2}$;
$7\frac{1}{2}\times 7\frac{1}{2}\times 7\frac{1}{2}\times 22\frac{1}{2}=9492.18$;
$\sqrt{9492.18}=97.42$ sq. decimeters, surface of larger end.
$9\times 3=27$; $27\div 2=13\frac{1}{2}$;
$13\frac{1}{2}-9=4\frac{1}{2}$;
$4\frac{1}{2}\times 4\frac{1}{2}\times 4\frac{1}{2}\times 13\frac{1}{2}=1230.18$;
$\sqrt{1230.18}=35.07$ sq. decimeters, surface of smaller end.

$15 \times 3 = 45$;
$9 \times 3 = 27$;
$45 + 27 = 72$; $72 \div 2 = 36$;
$36 \times 12 = 432$ sq. decimeters, convex surface;
$97.42 + 35.07 + 432 = 564.49$ sq. decimeters, $=$ 5.6449 sq. meters, entire surface, Ans.

(4.) $720 \div 2 = 360$; $360^2 = 129600$;
$477^2 = 227529 - 129600 = 97929$;
$\sqrt{97929} = 313$ nearly; $313 \div 3 = 104\frac{1}{3}$;
$720^2 = 518400 \times 104\frac{1}{3} = 54086400$;
$54086400 \div 27 = 2003200$ cu. yd., Ans.

(5.) $9.5 \times 9.5 \times .7854 = 70.882+$, area of the base;
$70.882+ \times \frac{21}{3} = 496.176+$ cu. feet, Ans.

(6.) $30 \times 30 \times .7854 = 706.86$, area of larger end.
$18 \times 18 \times .7854 = 254.46+$, area of smaller end.
$706.86 \times 254.46 = 179867.59+$;
$\sqrt{179867.59} = 424.1$;
$706.86 + 254.46 + 424.1 = 1385.42$ sq. in $=$ 9.62 sq. ft.;
$9.62 \times 15 = 144.3+$ cu. ft., Ans.

(7.) $27^2 = 729$ in., area of larger end.
$16^2 = 256$ " " " smaller "
$729 \times 256 = 186624$;
$\sqrt{186624} = 432$.
$729 + 256 + 432 = 1417$ sq. in. $= 9.84+$ sq. ft.;
$9.84 \times 6\frac{2}{3} = 61.22+$ cu. ft., Ans,

(ART. 430, p. 294.)

(1.) $9^2 \times 3.1416 = 254.46+$ sq. in., Ans.

(2.) $3.1416 \div 6 = .5236$;
$.5236 \times 12^3 = 904.78$ cu. centimeters $=$
$.000904780$ cu. meters, Ans.

(3.) $.5236 \times 15^3 = 1767.15$ cu. in., Ans.

(4.) $3.1416 \times 7912^2 = 196663355.75+$ sq. in., Ans.

(Art. 431, p. 295.)

(2.) $12^2 : 15^2 :: 113.09 : 176.70$ sq. ft., Ans.

(3.) $40^2 : 30^2 :: \$125 : \$70.31\frac{1}{4}$, Ans.

(4.) $\sqrt{1000} : \sqrt{900} :: 40 : 37.947+$, Ans.

(5.) $8^3 : 9^3 :: 36 : 51.25+$ kilos., Ans.

(6.) $\$6 : \$10368 :: 1^3 : 1728$;
$\sqrt[3]{1728} = 12$ in., Ans.

(7.) $1 : \frac{1}{2} :: (18\frac{1}{2})^3 : 3165.812$;
$\sqrt[3]{3165.812} = 14.68+$ in., Ans.

(8.) $1 : 3 :: 2^3 : 24$;
$\sqrt[3]{24} = 2.88+$ ft., Ans.

(9.) $30^2 : 20^2 :: 11\frac{1}{4}$ minutes : 5 minutes, Ans.

(10.) $1 : \frac{1}{8} :: 16^3 : 512$;
$\sqrt[3]{512} = 8$ ft., Ans.

(Art. 433, p. 296.)

(1.) 16 in. $= 1\frac{1}{3}$ ft.;
$20 \times 1\frac{1}{3} = 26\frac{2}{3}$ sq. ft., Ans.

(2.) 18 in. $= 1\frac{1}{2}$ ft.;
$16 \times 1\frac{1}{2} \times 3 \times 2 = 144$ sq. ft., Ans.

(3.) 4 in. $= \frac{1}{3}$ of a ft.;
$14 \times \frac{1}{3} \times 4 \times 6 = 112$ sq. ft., Ans.

(4.) 10 in. $= \frac{5}{6}$ of a ft.;
$24 \times \frac{5}{6} \times 6 \times .03 = \$3.60$, Ans.

(5.) $16 + 20 = 36$; $36 \div 2 = 18$ in. $= 1\frac{1}{2}$ ft.;
$22 \times 1\frac{1}{2} \times 3\frac{1}{2} = 115\frac{1}{2}$ sq. ft., Ans.

GAUGING.

(Art. 435, p. 297.)

(1.) $18^2 \times 30 \times .0034 = 33+$ gallons, Ans.

(2.) $22 - 16 = 6$; $\frac{2}{3}$ of $6 = 4$;
$(16 + 4)^2 \times 36 \times .0034 = 48.96$, Ans.

(3.) $36 - 32 = 4$; $\frac{2}{3}$ of $4 = 2\frac{2}{3}$;
$32 + 2\frac{2}{3} = 34\frac{2}{3}$;
$(34\frac{2}{3})^2 \times 60 \times .0034 = 245.146+$ gal., Ans.

(4.) $60 \times 60 = 3600$ sq. centimeters $=$
.36 sq. meters;
$.7854 \times .36 = .282744$ sq. meters;
$.282744 \times 1 \times 1000 = 282.744+$ liters, Ans.

MEDIAL PROPORTION.

(Art. 437, p. 298.)

(2.)

$$\begin{array}{rcrcr} \$.50 & \times & 8 & = & \$4.00 \\ .65 & \times & 12 & = & 7.80 \\ .60 & \times & \underline{10} & = & \underline{6.00} \\ & & 30) & & \underline{\$17.80} \\ & & & & \$.59\frac{1}{3}\text{, Ans.} \end{array}$$

(3.)

$$\begin{array}{rcrcr} \$1.00 & \times & 18 & = & \$18.00 \\ .60 & \times & 6 & = & 3.60 \\ 1.20 & \times & \underline{6} & = & \underline{7.20} \\ & & 30) & & \underline{\$28.80} \\ & & & & \$.96\text{, Ans.} \end{array}$$

(Art. 438, p. 300.)

(2.)

$$16\text{ c.}\left\{\begin{array}{lllll} 10\text{ c., to gain 1 c. take} & & & & \frac{1}{6}\text{ lb.} \\ 14\text{ c.,} & \text{“} & \text{“} & \text{“} & \frac{1}{2}\text{ lb.} \\ 17\text{ c.,} & \text{“ lose} & \text{“} & \text{“} & 1\text{ lb.} \\ 18\text{ c.,} & \text{“} & \text{“} & \text{“} & \frac{1}{2}\text{ lb.} \end{array}\right\} \times 6 = \left\{\begin{array}{l} 1\text{ lb.} \\ 3\text{ lb.} \\ 6\text{ lb.} \\ 3\text{ lb.} \end{array}\right.$$

(3.)

$$7\text{ c.}\left\{\begin{array}{lllll} 4\text{ c., to gain 1 c. take} & & & & \frac{1}{3}\text{ lb.} \\ 6\text{ c.,} & \text{“} & \text{“} & \text{“ “} & 1\text{ lb.} \\ 11\text{ c.,} & \text{“ lose } 1+1\text{ c.} & & \text{“} & \frac{1}{2}\text{ lb.} \end{array}\right\} \times 6 = \left\{\begin{array}{l} 2\text{ lb.} \\ 6\text{ lb.} \\ 3\text{ lb.} \end{array}\right.$$

Or,

$$7\text{ c.}\left\{\begin{array}{llll} 4\text{ c., to gain} & 3\text{ c.} & \text{take} & 1\text{ lb.} \\ 6\text{ c., “ “} & 1\text{ c.} & \text{“} & 1\text{ lb.} \\ 11\text{ c., “ lose} & 4\text{ c.} & \text{“} & 1\text{ lb.} \end{array}\right.$$

(4.)

$$\$4\left\{\begin{array}{l} \$3\text{, to gain \$1 take 1 gal.} \\ \$5\text{, “ lose “ “ 1 gal.} \\ \left.\begin{array}{l} \$7\text{, “ “ “ “ } \frac{1}{3}\text{ gal.} \\ \$0\text{, “ gain “ “ } \frac{1}{4}\text{ gal.} \end{array}\right\} \times 12 = \left\{\begin{array}{l} 4\text{ gal.} \\ 3\text{ gal.} \end{array}\right. \end{array}\right.$$

(5.)

$$\$8\left\{\begin{array}{l}\$6,\text{ to gain }\$1+\$1\text{ take 1 pig}\\ \$9,\text{ “ lose }\$1\qquad\text{“ 1 sheep}\\ \$10,\text{“ “ }\$1\qquad\text{“ }\tfrac{1}{2}\text{ colt}\end{array}\right\}\times 2=\left\{\begin{array}{l}\text{2 pigs.}\\ \text{2 sheep.}\\ \text{1 colt.}\end{array}\right.$$

(Art. **439**, p. **301**.)

(2.)

$$12\text{ c.}\left\{\begin{array}{l}\text{9 c., to gain 1 c. take }\tfrac{1}{3}\text{ lb.}\\ \text{10 c., “ “ “ “ }\tfrac{1}{2}\text{ lb.}\\ \text{13 c., “ lose “ “ 1 lb.}\\ \text{14 c., “ “ “ “ }\tfrac{1}{2}\text{ lb.}\end{array}\right\}\times 60=\left\{\begin{array}{l}\text{20 lb.}\\ \text{30 lb.}\\ \text{60 lb.}\\ \text{30 lb.}\end{array}\right.$$

$$30\div\tfrac{1}{2}=60.$$

(3.)

$$75\text{ c.}\left\{\begin{array}{l}\text{90 c., to lose 1 c. take }\tfrac{1}{15}\text{ lt.}\\ \text{0 c., “ gain “ “ }\tfrac{1}{75}\text{ lt.}\end{array}\right\}\times 750=\left\{\begin{array}{l}\text{50 lt.}\\ \text{10 lt.}\end{array}\right.$$

$$50\div\tfrac{1}{15}=750.$$

(5.)

$$\$70\left\{\begin{array}{l}\left.\begin{array}{l}\$60,\text{ to gain }\$1\text{ take }\tfrac{1}{10}\text{ of a cow}\\ \$80,\text{ “ lose “ “ }\tfrac{1}{10}\text{ of a cow}\end{array}\right\}\times 10=\left\{\begin{array}{l}\text{1 cow.}\\ \text{1 cow.}\end{array}\right.\\ \left.\begin{array}{l}\$40,\text{ “ gain “ “ }\tfrac{1}{30}\text{ of a cow}\\ \$100,\text{ “ lose “ “ }\tfrac{1}{30}\text{ of a cow}\end{array}\right\}\times 900=\left\{\begin{array}{l}\text{30 cows.}\\ \text{30 cows.}\end{array}\right.\end{array}\right.$$

$$30\div\tfrac{1}{30}=900.$$

It is evident, from the operation, that any same number of each of the $60 and $80 kinds may have been taken; hence there may have been sold 30 each of the several kinds.

(Art. **440**, p. **302**.)

(2.)

$$88\text{ c.}\left\{\begin{array}{l}\text{96 c., to lose 1 c. take }\tfrac{1}{8}\text{ lb.}\\ \text{90 c., “ “ “ “ }\tfrac{1}{2}\text{ lb.}\\ \text{78 c., “ gain }1+1\text{ c. “ }\tfrac{1}{5}\text{ lb.}\end{array}\right\}\times\tfrac{4480}{33}=\left\{\begin{array}{l}16\tfrac{32}{33}\\ 67\tfrac{29}{33}\\ 27\tfrac{5}{33}\end{array}\right.$$

$$\tfrac{1}{8}+\tfrac{1}{2}+\tfrac{1}{5}=\tfrac{33}{40};\ 112\div\tfrac{33}{40}=\tfrac{4480}{33}.$$

(3.)

$$50\text{ c.}\left\{\begin{array}{l}\text{40 c., to gain 2 c. take }\tfrac{1}{5}\text{ lb.}\\ \text{60 c., “ lose 1 c. “ }\tfrac{1}{10}\text{ lb.}\\ \text{70 c., “ “ “ “ }\tfrac{1}{20}\text{ lb.}\end{array}\right\}\times 114\tfrac{2}{7}=\left\{\begin{array}{l}22\tfrac{6}{7}\\ 11\tfrac{3}{7}\\ 5\tfrac{5}{7}\end{array}\right.$$

$$\tfrac{1}{5}+\tfrac{1}{10}+\tfrac{1}{20}=\tfrac{7}{20};\ 40\div\tfrac{7}{20}=114\tfrac{2}{7}.$$

(4.)

$$20\text{ ca.}\left\{\begin{array}{l}18\text{ ca., to gain 1 ca. take }\frac{1}{2}\text{ lb.}\\ 19\text{ ca., `` `` `` `` }1\text{ lb.}\\ 24\text{ ca., `` lose 2 ca. `` }\frac{1}{2}\text{ lb.}\end{array}\right\}\times\frac{1}{2}=\left\{\begin{array}{l}\frac{1}{4}\\ \frac{1}{2}\\ \frac{1}{4}\end{array}\right.$$

$$\frac{1}{2}+1+\frac{1}{2}=2;\ 1\div 2=\frac{1}{2}.$$

(5.)

$$9\text{ c.}\left\{\begin{array}{l}7\text{ c., to gain 1 c. take }\frac{1}{2}\text{ lb.}\\ 8\text{ c., `` `` `` `` }1\text{ lb.}\\ 10\text{ c., `` lose `` `` }1\text{ lb.}\\ 11\text{ c., `` `` `` `` }\frac{1}{2}\text{ lb.}\end{array}\right\}\times 30=\left\{\begin{array}{l}15\text{ lb.}\\ 30\text{ lb.}\\ 30\text{ lb.}\\ 15\text{ lb.}\end{array}\right.$$

$$\frac{1}{2}+1+1+\frac{1}{2}=3;\ 90\div 3=30.$$

(6.)

$$270\text{c.}\left\{\begin{array}{l}\left.\begin{array}{l}260\text{ c., to gain 1 c. take }\frac{1}{10}\text{ gal.}\\ 280\text{ c., `` lose `` `` }\frac{1}{10}\text{ gal}\end{array}\right\}\times 10=\\ \left.\begin{array}{l}240\text{ c., `` gain 1 c. `` }\frac{1}{30}\text{ gal.}\\ 290\text{ c., `` lose `` `` }\frac{1}{20}\text{ gal.}\end{array}\right\}\times 60=\end{array}\right.\left.\begin{array}{l}\left\{\begin{array}{l}1\text{ gal.}\\ 1\text{ gal.}\end{array}\right.\\ \left\{\begin{array}{l}2\text{ gal.}\\ 3\text{ gal.}\end{array}\right.\end{array}\right\}\times 9=\left\{\begin{array}{l}9\text{ gal.}\\ 9\text{ gal.}\\ 18\text{ gal.}\\ 27\text{ gal.}\end{array}\right.$$

$$1+1+2+3=7;\ 63\div 7=9.$$

ARITHMETICAL SERIES.

(ART. **445**, p. **304**.)

(1.) $2\times 4=8$;
$15+8=23$ years, age of oldest, Ans.

(2.) $\frac{1}{3}\times 32=10\frac{2}{3}$;
$12+10\frac{2}{3}=22\frac{2}{3}$ cts., Ans.

(3.) $3\times 39=117$;
$1.80-1.17=.63$ cts., Ans.

(ART. **446**, pp. **304**, **305**.)

(1.) $\frac{27\frac{1}{2}-5}{11-1}=2\frac{1}{4}$, Ans.

(2.) $\frac{27\frac{1}{2} - 5}{2\frac{1}{4}} + 1 = 11$, Ans.

(3.) $\frac{58 - 3}{5} + 1 = 12$ days, Ans.

(Art. **447**, p. **305.**)

(1.) $24 + 1 = 25$; $25 \times 24 = 600$;
$600 \div 2 = 300$, Ans.

(2.) $\frac{1}{4} \times 29 = 7\frac{1}{4}$;
$30 - 7\frac{1}{4} = 22\frac{3}{4}$, the distance traveled the thirtieth day.
$30 + 22\frac{3}{4} = 52\frac{3}{4}$; $52\frac{3}{4} \times 30 = 1582\frac{1}{2}$;
$1582\frac{1}{2} \div 2 = 791\frac{1}{4}$ miles, Ans.

(3.) $200 + 2 = 202$; $202 \times 100 = 20200$;
$20200 \div 2 = 10100$ yd. $= 5$ m. 1300 yd., Ans.

GEOMETRICAL SERIES.

(Art. **449**, p. **306.**)

(1.) $2^7 = 128$; $128 \times 6 = 768$, Ans.

(2.) $(\frac{1}{4})^5 = \frac{1}{1024}$; $4096 \times \frac{1}{1024} = 4$, Ans.

(3.) $(1\frac{1}{2})^{10} = \frac{59049}{1024}$;
$1024 \times \frac{59049}{1024} = \$59049$, Ans.

(Art. 450, p. 307.)

(1.) $768 \div 6 = 128$;
$\sqrt[7]{128} = 2$, Ans.

(2.) $4 \div 4096 = \frac{1}{1024}$;
$\sqrt[5]{\frac{4}{1024}} = \frac{1}{4}$, Ans.

(3.) $6144 \div 3 = 2048$;
$\sqrt[11]{2048} = 2$, Ans.

(Art. 451, p. 307.)

(1.) $128 \times 4 = 512$; $512 - 2 = 510$;
$110 \div 3 = 170$, Ans.

(2.) $2 =$ the rate;
$12 =$ No. of terms;
$2^{11} = 2048$;
$2048 \times 101 = 206848 =$ last term;
$206848 \times 2 = 413696$;
$413696 - 101 = 413595$; $413595 \div 1 = 413595$, Ans.

(3.) $3^{11} = 177147$; $177147 \times 1 = 177147 =$ last term;
$177147 \times 3 = 531441$; $531441 - 1 = 531440$;
$531440 \div 2 = \$265720$, Ans.

ANNUITIES.

(Art. 455, p. 309.)

2.) The amount of \$200 for 7 years at 6 % = \$284 = last term of the series;
$\$284 + \$200 = \$484$; $\$484 \times 4 = \$1936$, Ans.

(3.) $450 ÷ 4 = $112.50;
The amount of $112.50 for 10 years and 9 months = $185.06¼ = last term of the series.
$185.06¼ + $112.50 = $297.56¼;
$297.56¼ × 22 = $6546.37½,

(4.) Amount of $450 for 9 years at 7 % = $733.50 = last term of the series;
$733.50 + $450 = $1183.50;
$1183.50 × 5 = 5917.50, Ans.

(Art. **456**, pp. **309, 310.**)

(2.) The amount of $200 for 4 years at 7 % compound interest = $262.1592;
$262.1592 × 1.07 = $280.5103+;
$280.5103 — $200 = $80.5103; $80.5103 ÷ .07 = $1150.146+, Ans.

(3.) By the table, page 228, the amount of $1 at compound interest for 20 years at 7 % is $3.869685, and for 9 years is $1.838459;
$3.869685 × 1.838459 = $7.1142+;
$7.1142 × 40 = $284.568+;
$284.568 × 1.07 = $304.4877+;
$304.4877 — $40 = $264.4877+;
$264.4877 ÷ .07 = $3778.39+, Ans.

(4.) By the table, the amount of $1 at 3 % compound interest for 20 years = $1.806111, and for 9 years = $1.304773;
$1.806111 × 1.806111 × 1.304773 = $4.256+;
$4.256+ × 50 = $212.80 = amount of $50 for 49 deposits;
$212.81 × 1.03 = $219.1943+; $219.1943 — $50 = $169.1943;
$169.1943 ÷ .03 = $5639.81, Ans.

(ART. 457, p. 310.)

(2.) The amount of an annuity of $1000 for 4 years at 7 % = 4439.943.
The amount of $1 for 4 years at 7 % = $1.310796;
$4439.943 ÷ 1.310796 = $3387.207+, Ans.

(3.) The amount of an annuity of $154 for 19 years at 5 % compound interest = $4703; and the amount of $1 at compound interest for 19 years = $2.52695;
$4703 ÷ 2.52695 = $1861,13, Ans.

(4.) 30000 ÷ 5000 = 6, the number of years of the annuity.
The amount of an annuity of $5000 for 6 years at 6 % compound interest = $34876.5416+.
The amount of $1 at 6 % compound interest = $1.418519.
$34876.5416+ ÷ $1.418519 = $24586.62, Ans.

REVIEW EXERCISES.

(PAGES 310, 311.)

(1.) $11\frac{2}{5} = \frac{57}{5}$;
$\frac{57}{5} \times \frac{57}{5} \times \frac{57}{5} = \frac{185193}{125} = 1481\frac{68}{125}$, Ans.

(2.) $5 \times 5 \times 5 = 125$;
$125 \times 125 = 15625$, Ans.

(3.) $\sqrt{484} = 22$ = the number of dollars per acre, also the number of acres.

(4.) $\sqrt[3]{1953.125} = 12.5$ ft., Ans.

(5.) $\sqrt{841} = 29$, Ans.

(6.) 1 solid ft. = 1728 solid in., and $\frac{1}{2}$ solid ft. = $\frac{1}{2}$ of 1728 solid in. = 864 solid in;
$\frac{1}{2}$ ft. = 6 in; $6^3 = 6 \times 6 \times 6 = 216$ solid in. = a solid $\frac{1}{2}$ ft.;
$864 - 216 = 648$ solid in. = 3 times 216 solid in. = 3 solid $\frac{1}{2}$ ft., Ans.

(7.) $(\frac{1}{2})^2 : 1^2 :: 4$ hours : 16 hours, the time 1 pipe $\frac{1}{2}$ in. in diameter will fill the cistern, and 2 pipes will fill it in $\frac{1}{2}$ of 16 hours, or 8 hours, Ans.

(8.) To make the gain and loss equal for every 2 lb. he takes of the first kind, he must take 5 lb. of the second.

(9.) $51 - 6 = 45$; $10 - 1 = 9$;
$45 \div 9 = 5$, common difference, and, therefore, the difference between the 9th and 10th.

(10.) $50 \div 2 = 25$;
$26.7 \times 25 = 667.5$ sq. ft. = $74.1\frac{2}{3}$ yd.;
$\frac{1}{5}$ of a dollar = .20;
$74.1\frac{2}{3} \times .20 = \$14.83+$, Ans.

(11.) 10 A. = 1600 sq. rd.;
$\sqrt{1600} = 40$ rd., depth of side;
$40^2 \times 2 = 3200$;
$\sqrt{3200} = 56.55+$ rd., length of diagonal line;
$56.55 \div 2 = 28.27+$ rd., length of rope, Ans.

(12.) $3072 \div 12 = 256$;
$\sqrt[4]{256} = 4$ = the rate;
12 = first term;
$12 \times 4 = 48$ = second term,
$48 \times 4 = 192$ = third term;
$192 \times 4 = 768$ = fourth term;
$768 \times 4 = 3072$ = fifth term.

(13.) $\$924 \div 7 = \$232$, part of the price at the end of each year.

An annuity of \$232 at compound interest for seven years at 6 % $= \$1107.98 +$.

Present worth of the annuity $= \$1107.98 \div \$1.50363 = \$736.86 +$. $\$736.86 - \$700 = \$36.86$, most advantageous of cash down.

EXERCISES IN ANALYSIS.

(PAGES 312–316.)

(2.) $\frac{8}{9}, 3\frac{3}{7}, 6\frac{2}{5} = \frac{8}{9}, \frac{24}{7}, \frac{32}{5} = \frac{280}{315}, \frac{1080}{315}, \frac{2016}{315}$;
Greatest common divisor of 280, 1080, and 2016 three hundred fifteenths is $\frac{8}{315}$, Ans.

(3.) $\frac{2}{3}, \frac{3}{8}, \frac{6}{7}, \frac{11}{5} = \frac{560}{840}, \frac{315}{840}, \frac{720}{840}, \frac{1848}{840}$.
Greatest common divisor of 560, 315, 720, and 1848 eight hundred fortieths is $\frac{1}{840}$, Ans.

(5.) $\frac{3}{4}, \frac{6}{7}, \frac{5}{8} = \frac{42}{56}, \frac{48}{56}, \frac{35}{56}$.
Least common multiple of 42, 48, and 35 fifty-sixths is $\frac{1680}{56} = 30$, Ans.

(6.) Least common multiple of \$.75, \$.37½, and \$2.06¼ = \$8.25, Ans.

(8.) $46656 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$;
$2 \times 3 = 6 =$ sixth root, Ans.

(9.) $\frac{250}{686} = \frac{125}{343} = \frac{5 \times 5 \times 5}{7 \times 7 \times 7}$;
$\frac{5}{7}$ cube root, Ans.

(11.) If $\frac{1}{6}$ of the time past midnight $= \frac{2}{3} = \frac{4}{6}$ of the time past noon, $\frac{6}{6}$, or the time past midnight $= \frac{24}{6}$ of the time past noon; hence, the time from midnight to noon, or 12 hours, is $\frac{24}{6} - \frac{6}{6} = \frac{18}{6}$ of the time past noon, and the time past noon must be $\frac{6}{18}$ of 12 hours, or 4 hours;
Therefore, the hour must be 4 o'clock, P. M., Ans.

(12.) If $\frac{1}{2}$ of the time past 10 o'clock A. M. is the time till 10 o'clock P. M., $\frac{1}{2}$ of the time past 10 o'clock A. M. plus $\frac{2}{2}$ of the time past 10 o'clock A. M. is $\frac{3}{2}$, or the time from 10 o'clock A. M. to 10 o'clock P. M., which is 12 hours; then, $\frac{1}{2}$ of the time past 10 o'clock A. M. must be $\frac{1}{3}$ of 12 hours, or 4 hours, and $\frac{2}{2}$ of the time past must equal 8 hours.
Hence, the time must be 6 o'clock P. M., Ans.

(14.) $73 \div 5 = 14\frac{3}{5}$;
$73 \div 8 = 9\frac{1}{8}$;
$73 \div 10 = 7\frac{3}{10}$.
The least common multiple of $14\frac{3}{5}$, $9\frac{1}{8}$, $7\frac{3}{10} = \frac{2920}{40}$ $= 73$ days, Ans.

(15.) $11 \div 2 = 5\frac{1}{2}$, distance A travels in 1 min.;
$17 \div 3 = 5\frac{2}{3}$, " B " " " "
$5\frac{2}{3} - 5\frac{1}{2} = \frac{1}{6}$ rd. B gains in 1 min.;
$135 \div 2 = 67\frac{1}{2}$ rd., distance to gain;
$67\frac{1}{2} \div \frac{1}{6} = 405$ min. = the time they are traveling;
$5\frac{1}{2} \times 405 = 2227\frac{1}{2}$; $2227\frac{1}{2} \div 135 = 16\frac{1}{2}$, the number of times A travels round;
$5\frac{2}{3} \times 405 = 2295$; $2295 \div 135 = 17$, the number of times B travels round.

(17.) At 4 o'clock the hands were 20 spaces apart; therefore, the minute hand must gain 20 spaces. If it gain 55 spaces every time it passes over 60, it will gain 1 minute space in $\frac{1}{55}$ of 60, and 20 spaces in $\frac{20}{55}$ of 60 =
21 min. $49\frac{1}{11}$ sec. past 4 o'clock, Ans.

(18.) The time from Tuesday noon to Sunday at $10\frac{1}{4}$ o'clock A. M. = 4 d. $22\frac{1}{4}$ h. = $4\frac{89}{96}$ d.
3 min. 10 sec. = 190 sec.;
$190 \times 4\frac{89}{96} = 936\frac{7}{48}$ sec. = 15 min. $36\frac{7}{48}$ sec.;
10 min. + 15 min. + $36\frac{7}{48}$ sec. = 25 min. $36\frac{7}{48}$ sec.;
10 o'clock 15 min. + 25 min. $36\frac{7}{48}$ sec. =
10 o'clock 40 min. $36\frac{7}{48}$ sec., Ans.

(20.) Had he worked every day, he would have received 80 times \$.72 = \$57.60. He lost, therefore, \$57.60 + \$12 = \$69.60. Every day he was idle he lost \$.72 + \$.48 = \$1.20.
\$69.60 ÷ \$1.20 = 58 days idle, Ans.

(21.) If he had worked every day, he would have received 25 times \$1.25 = \$31.25;
\$31.25 — \$23.75 = \$7.50.
Every day he was idle he lost \$1.25 + .25 = \$1.50;
\$7.50 ÷ \$1.50 = 5 days idle;
25 — 5 = 20, number of days he worked, Ans.

(23.) \$40 ÷ 8 = \$5. Therefore, B spends \$5 per year more than his income, and \$30 — \$5 = \$25, which is $\frac{1}{8}$ of each one's income.
$\frac{8}{8}$, or the whole income = \$200.
A spends $\frac{7}{8}$ of \$200 = \$175;
B " \$200 + 5 = \$205.

(24.) If they save \$400 in 4 years, in one year they will save \$100. Both incomes $=$ \$800, and if they save \$100, they will both spend \$800 — \$100 $=$ \$700; \$700 — \$40 $=$ \$660.

\$660 $\div$ 2 $=$ \$330, B spends.

\$330 $+$ \$40 $=$ \$370 A spends.

(26.) A is entitled to $\frac{1}{2}$, and $\frac{1}{2}$ will remain for B and C.

Therefore, as $1 : \frac{1}{2} : : 60^2 : 1800$;

$\sqrt{1800} = 42.426+$ in., the part remaining after A has ground his share.

$60 - 42.426+ = 17.573+$ in., A's share.

B is entitled to $\frac{1}{4}$, and $\frac{1}{4}$ will remain;

Therefore, as $1 : \frac{1}{4} : : 60^2 : 900$;

$\sqrt{900} = 30$ in.;

$42.426+ - 30 = 12.426+$ in., B's share; and there remains, as C's share, a part 30 in. in diameter.

(27.) Each lady is entitled to $\frac{1}{4}$. After the first has taken her share, $\frac{3}{4}$ will remain;

Hence, as $1 : \frac{3}{4} : : 5^3 : 93.75$;

$\sqrt[3]{93.75} = 4.542+$ in.;

$5 - 4.542 = .45+$ in.;

Therefore, the first lady winds off .45 in.

After the second has taken her share, $\frac{1}{2}$ will remain;

Hence, as $1 : \frac{1}{2} : : 5^3 : 62.5$;

$\sqrt[3]{62.5} = 3.968+$ in.;

$4.542 - 3.968 = 57+$ in.;

Therefore, the second winds off .57 in.

After the third lady has taken her share, $\frac{1}{4}$ will remain;

Hence, as $1 : \frac{1}{4} : : 5^3 : 31.25$,

$\sqrt[3]{31.25} = 3.149+$ in.;

$3.968 - 3.149 = .82$ in. nearly;

Therefore, the third lady winds off .82 in., and there remains, as the fourth lady's share, a part 3.14+ in. in diameter.

MISCELLANEOUS EXERCISES.

(PAGES 317–320.)

(1.) $22515 \div 95 = 237$, Ans.

(2.) $\frac{1}{3}$ of $2 = \frac{2}{3}$;
$\frac{\frac{2}{3}}{3} = \frac{2}{9}$, Ans.

(3.) $\frac{1}{2} + \frac{2}{7} + \frac{1}{6} = \frac{20}{21}$:
$80 \div \frac{20}{21} = 84$, Ans.

(4.) $\frac{2}{3}$ of $\frac{4}{5}$ of $1\frac{1}{2} = \frac{4}{5}$;
And $\frac{4}{5}$ divided by itself will produce **1;**
Or, $\frac{4}{5} \times 1 = \frac{4}{5}$, Ans.

(5.) $.1 \times .1 = .01$, Ans.

(6.) 113 A. 145 P. = 18225 P.;
12 A. 10 P. = 1930 P.;
$18225 \div 1930 = 9\frac{171}{386}$, Ans.

(7.) $7' \div 15 = \frac{7}{15}$ min. = 28 sec., **Ans.**

(8.) 5 m. = 1600 rd.;
3 m. 5 fur. $18\frac{1}{2}$ rd. = $1178\frac{1}{2}$ rd.;
$\frac{1178\frac{1}{2}}{1600} = \frac{2357}{3200}$, Ans.

(9.) 43560 = number of sq. ft. in 1 acre.
$\sqrt{43560} = 208+$ ft., length of one side of an acre;
$208 \div 4 = 52$ spaces.
If the hills occupy simply a mathematical point, and be planted to the edge of the land, there may be 53 rows with 53 hills in a row, or $53 \times 53 =$

2809 hills. But it is to be presumed the hills are planted in the usual manner, so that, by being 4 ft. apart in the square order, there will be 4 × 4 = 16 sq. ft. of surface to each hill, and as many hills as 43560 sq. ft. contains times 16 sq. ft., or 2722 hills, Ans.

(10.) 8 miles — 6 miles = 2 miles;
20 hours ÷ 2 = 10 hours, Ans.

(11.) $3\frac{1}{2} \times 6\frac{1}{4} = \frac{175}{8}$; $6\frac{1}{4}$ cu. ft. = 10800 cu. in.;
$10800 \div \frac{175}{8} = 493\frac{5}{7}$ in. in length = $41\frac{1}{7}$ ft., Ans.

(12.) $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{16}$;
$\frac{1}{16}$ of 1 gal., or 32 gills = 2 gills, Ans.

(13.) As 1.45 : 1.00 : : 1.00 : $.68\frac{28}{29}$, Ans.

(14.) 100 % — 30 % = 70 %. If 70 % = \$.84, 1 % = \$.012, and 120 % = \$.012 × 120 = \$1.44, Ans.

(15.) .9325 + .00125 = .93375;
\$540 ÷ .93375 = $\$578\frac{26}{83}$, Ans.

(16.) If he gave away $\frac{1}{2}$ of an apple more than $\frac{1}{2}$ of the number at the last gate, and had 1 left, he must have had 1 more than twice 1, or 3 at the last gate; and, for like reason, 7 at the second gate; and 15 at the first gate.

(17.) A can do $\frac{1}{3}$ of the work in a day; B can do the work in $\frac{1}{3}$ of 8 days, or $\frac{3}{8}$ of it in one day; C can do the work in $\frac{1}{5}$ of 12 days, or $\frac{5}{12}$ of it in one day;
Hence, they can all do in one day $\frac{1}{3} + \frac{3}{8} + \frac{5}{12} = \frac{27}{24}$;
Then, as $\frac{27}{24} : \frac{24}{24}$: : 1 day : $\frac{8}{9}$ of a day =
$21\frac{1}{3}$ hours, Ans.

(18.) $\$.15 \div .90 = \$.16\frac{2}{3}$;
$40\ \%$ of $\$.16\frac{2}{3} = \$.06\frac{2}{3}$;
$\$.16\frac{2}{3} + \$.06\frac{2}{3} = \$.23\frac{1}{3}$, the selling price per pound;
$525 \div .23\frac{1}{3} = 2250$ lb., Ans.

(19.) $\$220 \div .12 = \$1833.33\frac{1}{3}$;
$\$1833.33\frac{1}{3} - \$1575 = \$258.33\frac{1}{3}$, Ans.

(20.) Compound interest of \$300 for 4 years at 6 % = \$78.74+;
Annual interest = \$78.48;
\$78.74+ — \$78.48 = \$.26+, Ans.

(21.) Three months after Jan. 6 = April 6;
The time from March 4 to April 6 = 33 days; and 33 days + 3 days of grace = 36 days, Ans.

(22.) 8 mo. after Jan. 20 = Sept. 20;
Time from June 20 to Sept. 20 = 3 mo.;
Interest of \$40 for 3 mo. and 3 d. at 2 % a mo. = \$2.48;
\$40 — \$2.48 = \$37.52, Ans.

(23.) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4} = \frac{6}{12}, \frac{4}{12}, \frac{3}{12}$;
$\frac{1}{2}$ of $\frac{6}{12} = \frac{3}{12}$;
$\frac{3}{12}$ for 4 mo. $= \frac{12}{12}$ for 1 mo.;
$\frac{3}{12}$ for 13 mo. $= \frac{39}{12}$ for 1 mo.;
$\frac{12}{12} + \frac{39}{12} = \frac{51}{12}$, A's capital for 1 mo.
$\frac{4}{12}$ for 13 mo. $= \frac{52}{12}$, B's capital for 1 mo.
$\frac{3}{12}$ for 13 mo. $= \frac{39}{12}$, C's capital for 1 mo.
$\frac{51}{12} + \frac{52}{12} + \frac{39}{12} = \frac{142}{12}$;
A should receive $\frac{51}{142}$ of \$2840 = \$1020.
B should receive $\frac{52}{142}$ of \$2840 = \$1040.
C should receive $\frac{39}{142}$ of \$2840 = \$780.

(24.) 1 franc = \$.186 ; \$.186 × 250 = \$46.50 ;
.20 of \$46.50 = \$9.30 ;
\$46.50 + \$9.30 = \$55.80, the price in United States money for which it must be sold to gain 20 %.
1 liter = .26417 gal. ;
.26417 × 100 = 26.417 gal. ;
\$55.80 ÷ 26.417 = \$2.11+, Ans.

(25.) If 6 lb. of coffee = 20 lb. of sugar, 4 lb. of coffee, or 3 lb. of tea = $\frac{2}{3}$ of 20 = 13$\frac{1}{3}$ lb. of sugar ; and if 3 lb. of tea = 13$\frac{1}{3}$ lb. of sugar, 3 times 3 lb., or 9 lb. of tea = 3 times 13$\frac{1}{3}$ = 40 lb. of sugar, Ans.

(26.) The express reaches the point in as many hours as 25 is found times in 120 = 4$\frac{4}{5}$ hours, or 4 h. 48 min.
It will take the slow train as many times 50 min. as 15 is found times in 120 = 8 times ; and 8 times 50 min. = 400 min. = 6 h. 40 min.
The slow train must start as much before 2 as the difference.
6 h. 40 min. — 4 h. 48 min. = 1 h. 52 min. ; and 1 h. 52 min. before 2, is 12 o'clock, 8 min., Ans.

(27.) The amount of \$200 for 3 mo. at 6 % = \$203, Ans.

(28.) \$6460 — \$5000 = \$1460.
The interest of \$5000 at 1 % for 4 years = \$200 ;
\$1460 ÷ \$200 = .07$\frac{3}{10}$ = 7$\frac{3}{10}$ %, Ans.

(29.) There will be 16 boards 24 ft. long and 1 ft. wide and 16 times 24 ft. = 384 ft., Ans.

(30.) 2 × 1.4 × 1 = 2.8 cu. meters ;
1 cu. meter = 10 hectoliters ;
2.8 × 10 = 28 hectoliters ;
28 × 75 = 2100 kilos., Ans.

(31.) $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$;
Therefore, $\frac{1}{6}$ must remain.
25 — 5 = 20 = $\frac{1}{6}$ of the whole;
$\frac{6}{6}$ = 120;
$\frac{1}{2}$ of 120 lb. + 25 lb. = 85 lb. of coffee;
$\frac{1}{3}$ of 120 lb. — 5 lb. = 35 lb. of chicory;
$\frac{35}{120}$, or $29\frac{1}{6}$ % of the whole = chicory, Ans.

(32.) \$144 for 7 mo. = \$1008 for 1 mo.;
$\frac{1}{2}$ of \$144 = \$72;
$\frac{1}{3}$ of \$144 = \$48 for 4 mo. = \$192 for 1 mo.;
\$1008 — \$192 = \$816;
\$72 + \$48 = 120;
\$144 — \$120 = \$24;
816 ÷ 24 = 34 mo. =
2 years, 10 mo., Ans.

(33.) Interest of \$1 for 63 days = \$.0105;
\$1 — \$.0105 = \$.9895;
\$3958 ÷ .9895 = \$4000, Ans.

(34.) 4 meters = 40 decimeters;
3 centimeters = .3 decimeters;
40 × 1 × .3 = 12 cu. decimeters;
1 liter = 1 cu. decimeter;
12 liters = 12 cu. decimeters;
12 liters will weigh 12 kilos.;
12 × 7.8 = 93.6 kilos., Ans.

(35.) $3^2 \times 3 : 6^2 :: 3$ h. : 4 h., the time 3 pipes 3 in. in diameter will discharge the same amount of water as 1 pipe 6 in. in diameter; and the three pipes will discharge 3 times the quantity in 3 times 4 h., or in 12 h., Ans.

(36.) The interest of \$600 for 3 mo. and 20 d. at 7 % = \$12.83;
\$600 — \$12.83 = \$587.17, Ans.

(37.) The cat gains 2 ft. every quarter of an hour, except the last, when she gains an additional 2 ft. This deducted from 24 ft. = 22 ft. The cat will be as many quarters of an hour catching the mouse as 2 is found times in 22, or 11 qr. = $2\frac{3}{4}$ h., Ans.

(38.) $40^2 = 1600$;
$36^2 = 1296$;
$1600 + 1296 = 2896$;
$\sqrt{2896} = 53.81+$ rd., Ans.

(39.) 1 A. 41 rd. = 201 rd.;
$201 \div .7854 = 255.92+$ sq. rd.;
$\sqrt{255.92+} = 16$ rd. nearly = the diameter of the garden.
$201 - 12 = 189$ rd.;
$189 \div .7854 = 240.64$ sq. rd.;
$\sqrt{240.64} = 15.5+$ rd. = the diameter;
$16 - 15.5 = .5+$ rd. = 8 ft.+;
8 ft. $\div 2 = 4$ ft., width of the walk, Ans.

APPENDIX.

(Art. **460**, p. **322.**)

(1.) 3380. (2.) 1642.

(Art. **461**, p. **323.**)

(1.)	(2.)	(3.)	(4.)
$35\frac{1}{4}$	$73\frac{1}{3}$	$73\frac{2}{5}$	$27\frac{3}{8}$
$25\frac{1}{4}$	$27\frac{1}{3}$	$12\frac{2}{5}$	$5\frac{3}{8}$
875	1971	876	135
15	$33\frac{1}{3}$	34	12
$\frac{1}{16}$	$\frac{1}{9}$	$\frac{4}{25}$	$\frac{9}{64}$
$890\frac{1}{16}$	$2004\frac{4}{9}$	$910\frac{4}{25}$	$147\frac{9}{64}$

(Art. **462**, p. **323.**)

(3.) 5605 × 1000 = 5605000; 5605000 ÷ 4 = 1401250.

(Art. **463**, p. **324.**)

(3.) 140125 ÷ 1000 = 140.125; 140.125 × 4 = 560.5.

(Art. **464**, p. **325.**)

(1.) March 4th to June 4th = 92 days; June 4th to June 17th = 11 days; 92 + 11 = 103 days.

(2.) November 13, 1872, to March 13, 1873 = 120 days; March 13 to April 9 = 27 days. 120 + 27 = 147 days.

(3.) March 17 to May 17 = 61 days; May 17 to May 19 = 2 days. 61 + 2 = 63 days.

(Art. **465**, p. **326**.)

(2.) $\frac{\$64.50 \times 60}{52} = \$.74+.$ (3.) $\frac{\$9600 \times 63}{48} = \$126.$

(Art. **466**, p. **326**.)

(1.)

Principal,		$1000.00
1st payment,	$100.00	
Interest of $1000 from July 1, 1864, to June 1, 1865,	30.00	
Balance to liquidate the principal,		70.00
New principal,		$930.00
2d payment,	$223.99	
Interest of $930 from Jan. 1, 1865, to Sept. 1, 1866,	93.00	
Balance to liquidate the principal,		130.99
New principal,		$799.01
Interest of $799.01 from Sept. 1, 1866, to Dec. 25, 1866,	$15.18	
3d payment,	12.00	
Balance of interest,	$3.18	
Interest of $799.01 from Dec. 25, 1866, to Jan. 1, 1867, .	.93	
Sum of interest due,		4.11
Balance of note due Jan. 1, 1867,		$803.12

If the interest of $799.01 be taken from Sept. 1, 1866, to Jan. 1, 1867, instead of from Sept. 1, 1866, to Dec. 25, 1866, and from Dec. 25, 1866, to Jan. 1, 1867, it will be $15.98, and the answer $802.99.

(2.)

Principal,		$700.00
1st payment,	$164.00	
Interest of $164 from Dec. 18, 1864, to Feb. 4, 1865,	1.26	
Amount of payment,	$165.26	
Interest of $700 from Feb. 4, 1864, to Feb. 4, 1865,	42.00	
Balance to liquidate the principal,		123.26
New principal,		$576.74
2d payment,	$200.00	
Interest of $200 from June 24, 1865, to Feb. 4, 1866,	7.33	
3d payment,	120.00	
Interest of $120 from Sept. 11, 1865, to Feb. 4, 1866,	2.86	
Amount of payments,	$330.19	
Interest of $576.74 from Feb. 4, 1865, to Feb. 4, 1866,	34.60	
Balance to liquidate the principal,		295.59
New principal,		$281.15
4th payment,	$60.00	
Interest of $60 from July 5, 1866, to Nov. 28, 1866,	1.43	
Amount of payment,	$61.43	
Interest of $281.15 from Feb. 4, 1866, to Nov. 28, 1866,	13.78	
Balance to liquidate the principal,		47.65
Balance of note, Nov. 28, 1866,		$233.50

(3.)

Principal,		$625.50
1st payment,	$200.00	
Interest of $625.50 from Oct. 1, 1864, to Jan. 1, 1865,	9.38	
Balance to liquidate the principal,		190.62
New principal,		$434.88
Interest of $434.88 from Jan. 1, 1865, to Nov. 1, 1865,	$21.74	
2d payment,	20.00	
Balance of interest,	$1.74	
Interest of 434.88 from Nov. 1, 1865, to Jan. 1, 1866,	4.35	
Sum of interest,	$6.09	
3d payment,	$300.00	
Interest,	6.09	
Balance to liquidate the principal,		293.91
New principal,		$140.97
Interest of $140.97 from Jan. 1, 1866, to May 1, 1866,		2.82
Balance of note due May 1, 1866,		$143.79

(4.)

Principal,			$1000.00
Interest of $1000 for 1 year,		$60.00	
1st payment,	$24.00		
Interest of $24 from April 1, 1866, to Jan. 1, 1867,	1.08		
2d payment,	4.00		
Interest of $4 from Aug. 1, 1866, to Jan. 1, 1867,	.10		
Carried forward,	$29.18	$60.00	$1000.00

Brought forward,	$29.18	$60.00	$1000.00
3d payment,	6.00		
Interest of $6 from Dec. 1, 1866, to Jan. 1, 1867,	.03		
Amount of payments,		35.21	
Balance of interest,		$24.79	
4th payment,	$60.00		
Interest of $60 from Feb. 1, 1867, to Jan. 1, 1868,	3.30		
5th payment,	40.00		
Interest of $40 from July 1, 1867, to Jan. 1, 1868,	1.20		
Amount of payments,		$104.50	
Interest of $1000 from Jan. 1, 1867, to Jan. 1, 1868,	$60.00		
Balance of interest unpaid Jan, 1, 1867,	24.79		
Interest of $24.79 from Jan. 1, 1867, to Jan. 1, 1868,	1.49		
Sum of interests,		$86.28	
Balance to liquidate the principal,			18.22
New principal,			$981.78
Interest of $981.78 from Jan. 1, 1868, to Jan. 1, 1869,		$58.91	
Interest of $58.91 from Jan. 1, 1869, to June 1, 1870,		5.01	
Interest of $981.78 from Jan. 1, 1869, to Jan. 1, 1870,		58.91	
Interest of $58.91 from Jan. 1, 1870, to June 1, 1870,		1.47	
Interest of $981.78 from Jan. 1, 1870, to June 1, 1870,		24.54	
Sum of interests,			148.84
Balance of note June 1, 1870,			$1130.62

(Art. 468, p. 328.)

(1.) $\$31.89 \times 2 \times 4 \times 10 = \$2551.20$.

(2.) $\$524 \times 10 \times 2 = \$1048$; $\$2000 - \$1048 = \$952$.

(Art. 471, p. 329.)

(1.) $16 \times 12 \times 10 = 1920$ cu. ft.; $1920 \div 550 = 3\frac{27}{55}$ tons.

(2.) $3 \times 12 \times 30 = 1080$; $\frac{3}{4}$ of $1080 = 810$ lb.; $1080 - 810 = 270$; $2.70 \times 60 = 162$ lb. Ans. 810 lb. of hay; 162 lb. of oats.

(3.) $6 \times 5 \times 4 \times \frac{8}{10} = 96$ bu.

(4.) $35 \times 6 \times 8 \times \frac{4}{10} = 672$ bu.; $672 \times .50 = \$336$.

(5.) $30 \times 12 \times 15 = 5400$; $5400 \div 500 = 10.8$; $10.8 \times 25 = \$270$. $3 \times 11 \times 3 = 99$; $2\frac{1}{2} \times 10 \times 6 = 150$; $99 \times 150 = 249$ lb. $10.8 \times 2000 = 21600.0$ lb.; $21600 \div 249 = 86\frac{63}{83}$ days.

(Art. 474, p. 330.)

(1.) $50 \times (11.8 \times 11.8) \div 144 = 48.347$ cu. ft.

(2.) 5 ft. 10 in. = 70 in.; $\frac{70}{4} \times \frac{70}{4} = 306.25$; $(306.25 \times 32\frac{1}{2}) \div 144 = 69.119$; $69.119 \times .40 = \$27.647+ = \$27.65$.

(3.) $$\frac{\$16 \times 24 \times 20 \times 20}{144 \times 40} = \$26.66\frac{2}{3}, \text{ or } \$26.67.$$

(Art. 475, p. 330.)

(1.) $$\frac{24 \times 20 \times 10}{12} = 400 \text{ bd. ft.}$$

(2.) $30 \times .7041 = 21.21 +$ inches.

(3.) $$\frac{25 \times 32 \times 30 \times 15}{12 \times 1000} = \$30.$$

(Art. 478, p. 331.)

(1.) $$\frac{(66 \times 9) + (30 + 3) \times 9}{16\frac{1}{2}} = 54;\ 54 \times 2 = 108 \text{ perch.}$$

(2.) $\frac{40 \times 25 \times (20 \times 2)}{1000} = 40$ thousands; $\$14 \times 40 = \$560.$
$\$1.80 \times 40 = \$72$; $\$.12 \times 10 \times 40 = \$48$; $\$560 + \$72 + \$48 = \$680.$

(3.) $\frac{45 \times 27}{9 \times 9} = 15$ cask.

(4.) $105 \div 30 = 3\frac{1}{2}$ $\$2 \times 3\frac{1}{2} = \$7$; $\$.10 \times 10 \times 3\frac{1}{2} = \$3.50$; $\$.50 \times 3 = \$1.50$; $\$4 \times 3\frac{1}{2} = \$14$; $\$2.25 \times 2 = \$4.50$; $\$7 + \$3.50 + \$1.50 + \$14 + \$4.50 + \$3.50 = \$34.$

(Art. 481, p. 332.)

(1.) $\frac{24 \times 15 \times 2}{120} = 6$; $\$6.50 \times 6 = \$39.00$; $\$.06 \times 6 \times 6 = \$2.16$; $\$3 \times 6 = \$18.$ $\$39 + \$2.16 + \$18 = \$59.16.$

(2.) $\frac{40 \times 25}{150} = 6\frac{2}{3}$ thousands.

(3.) $\frac{110 \times 63}{55 \times 9} = 14$ thousands; $\$3.50 \times 14 = \$49$; $\$.07 \times 7 \times 14 = \$6.86$; $\$1.25 \times 14 = \$17.50$; $\$49 + \$6.86 + 17.50 = \$73.36.$

APPENDIX.

ANSWERS TO EXERCISES

IN THE

NEW ELEMENTARY ARITHMETIC.

NOTATION.

Pp.	Ex.		Pp.	Ex.	
17.	3.	2,030	20.	15.	15,115
	4.	83,333		16.	79,907
	5.	906,666		17.	67,306
	6.	316,000		18.	635,438
	7.	21,021		19.	42,444
	8.	250,500		20.	98,609
	9.	999		21.	19,351
	10.	999,999		22.	100,047
20.	2.	770		23.	1,010,010
	3.	1,885		24.	61,016,605
	4.	3,553		25.	812,347
	5.	11,001	21.	26.	12,020,301
	6.	1,111		27.	7,923,406
	7.	73,592		28.	3,111,220,002
	8.	84,909		29.	581,036,029
	9.	230,506		30.	1,000,001,001,091
	10.	41,019		31.	29,050,150
	11.	9,907		32.	100,100,101
	12.	89,097		33.	631,124,066
	13.	21,121		34.	5,000,000,005,005
	14.	300,006		35.	290,630,402,479,815

ADDITION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
29.	8.	1109	29.	20.	891	30.	37.	21248
	9.	1531		21.	1048		39.	1799
	10.	1504		22.	2097	31.	44.	8050
	11.	1081	30.	23.	9945		47.	8312
	12.	1683		24.	1851		48.	1843
	13.	1952		25.	1294		49.	2311
	14.	1863		26.	21464		50.	22765
	15.	1833		27.	8276	32.	52.	300
	16.	769		28.	7676		54.	1511
	17.	919		29.	5851		57.	347
	18.	215		30.	11866		59.	353
	19.	712		33.	14163			

SUBTRACTION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
39.	6.	127	40.	15.	791	41.	39.	46
	7.	507		16.	331		43.	2877
	8.	710		17.	101		48.	938958
	9.	707		18.	665	42.	50.	94934477
	10.	113		19.	1008		2.	200
	11.	189		20.	989		4.	81
	12.	301		21.	3628	43.	7.	10
	13.	11		28.	154			
40.	14.	89		29.	1608			

MULTIPLICATION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
49.	8.	4949	49.	16.	14556	50.	24.	453915
	9.	1005		17.	4121		35.	47100
	10.	4836		18.	20390		36.	16686
	11.	378		19.	17640	51.	39.	6892000
	12.	5424		20.	54533	52.	3.	325
	13.	11341	50.	21.	195657		6.	220
	14.	12305		22.	233704	53.	10.	29415
	15.	12032		23.	529518		12.	3190

DIVISION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
62.	10.	$116\frac{1}{7}$	66.	9.	958	67.	31.	960
	11.	$284\frac{1}{6}$		10.	$314\frac{50}{95}$		42.	$176\frac{50}{100}$
	12.	$1011\frac{1}{9}$		15.	100		44.	60
	13.	$946\frac{3}{4}$		17.	$2854\frac{14}{16}$		46.	$67\frac{9}{11}$
	14.	$11567\frac{2}{7}$		18.	$2527\frac{1}{183}$	68.	2.	10817
	15.	1760		22.	45		3.	206
	16.	$11296\frac{3}{4}$		25.	$1422\frac{12}{19}$		7.	2078
	17.	10120		26.	$1309\frac{2}{35}$			
63.	35.	327		29.	185			

UNITED STATES MONEY.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
73.	3.	$261.795	73.	11.	$1317.18	76.	4.	$17.00
	4.	$944.415	74.	3.	$101.29		5.	$164.40
	6.	$1809.50		4.	$67.985	77.	13.	$7680
	8.	$305.50	75.	6.	$760.96			
	10.	$116.78		11.	$76.50			

FACTORING.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
82.	3.	3 × 19	83.	11.	$6972	88.	10.	24
	6.	5 × 19	85.	6.	30	89.	16.	$48
	2	12675		8.	24		20.	$2.34
83.	3.	5535	88.	4.	$51		22.	378
	8.	$6930		9.	$1.14			

COMMON FRACTIONS.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
95.	5.	$\frac{1}{2}$	100.	11.	$1\frac{23}{24}$	109.	19.	$\frac{11}{10}$
	6.	$\frac{7}{8}$		12.	$2\frac{15}{120}$	110.	5.	$\frac{4}{37}$
	10.	$\frac{9}{11}$	101.	19.	$40\frac{7}{60}$		6.	$\frac{1}{120}$
	11.	$\frac{3}{4}$		21.	$\$291\frac{9}{40}$		9.	$\frac{2}{65}$
96.	2.	$\frac{56}{4}$	102.	6.	$2\frac{3}{7}$		10.	$\frac{1}{35}$
	3.	$\frac{95}{5}$		7.	$1\frac{23}{24}$		13.	$\frac{11}{16}$
	4.	$\frac{248}{8}$		11.	$1\frac{13}{24}$	111.	16.	$\frac{6}{7}$
	5.	$\frac{294}{3}$		12.	$2\frac{25}{120}$		18.	$1\frac{3}{8}$
	6.	$\frac{2380}{39}$	103.	20.	$9\frac{11}{20}$	112.	6.	$16\frac{1}{2}$
	7.	$\frac{2295}{17}$	104.	5.	$10\frac{4}{5}$		10.	40
97.	5.	$\frac{82}{13}$		6.	$6\frac{5}{12}$		15.	$14\frac{2}{5}$
	9.	$\frac{6461}{40}$		10.	19		17.	$20\frac{20}{39}$
	10.	$\frac{135}{15}$		11.	18	113.	5.	$1\frac{5}{14}$
	11.	$\frac{1441}{11}$	105.	15.	$51\frac{3}{7}$		6.	$1\frac{1}{13}$
	4.	$24\frac{1}{3}$		17.	$225\frac{5}{11}$		10.	$10\frac{6}{7}$
	5.	45	106.	5.	15		11.	$1\frac{19}{20}$
	8.	1		6.	$14\frac{4}{7}$		13.	$\frac{1}{4}$
	9.	$30\frac{5}{8}$		10.	$9\frac{7}{12}$		15.	$8\frac{4}{5}$
99	7.	$\frac{5}{15}, \frac{9}{15}, \frac{4}{15}$		11.	$22\frac{4}{9}$	114.	11.	$\frac{4}{77}$
	8.	$\frac{6}{16}, \frac{2}{16}, \frac{4}{16}$	107.	17.	$379\frac{5}{6}$		17.	$\frac{14}{11}$
	9.	$\frac{40}{48}, \frac{18}{48}$		19.	1386		21.	$4\frac{4}{7}$
	10.	$\frac{6}{8}, \frac{7}{8}, \frac{12}{8}$	108.	5.	$\frac{11}{14}$	115.	28.	15
100.	6.	$2\frac{3}{7}$		9.	$\frac{24}{75}$			
	7.	$1\frac{23}{24}$		11.	$\frac{2}{5}$			

DECIMAL FRACTIONS.

Pp.	Ex.		Pp.	Ex.	
122.	4.	.005	123.	3.	.161 and .010
	5.	.065		5.	.5216 and .1600
	8.	.0014		6.	.80000 and .09163
	9.	.1068		7.	$\frac{1}{16}$
	12.	103.21	124.	4.	.725
	13.	162.0121		5.	.85
	19.	.0325	125.	4.	38.7535
123	2.	.060 and .103			

Pp.	Ex.		Pp.	Ex.	
125.	5.	26.1941	128.	18.	.00096
	6.	1543.163	129.	24.	17.327
126.	2.	78.685	130.	6.	.35
	6.	5.625		7.	35
	7.	18.875		8.	185
	12.	63.879674		11.	.131
128.	7.	.0371		12.	.00131
	8.	132.606	131.	19.	3.65
	11.	91.6		24.	8.2
	12.	42.25	132.	14.	49.5625
	15.	.000081	133.	6.	$1702.20
	16.	63		9.	$45

REDUCTION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
155.	40.	$11.76	156.	46.	$15	157.	61.	$8.60
	41.	$400	157.	56.	$1410.15	158.	62.	645 lb.

COMPOUND NUMBERS.

Pp.	Ex.	
160.	5.	22 m. 1 fur. 20 rd. 2 yd.
	7.	162 A. 2 R. 23 P.
	9.	20 cu. yd. 24 cu. ft. 121 cu. in.
161.	12.	20 hhd. 60 gal. 2 qt. 0 pt. 3 gills.
	14.	94 bu. 2 pk. 6 qt. 0 pt.
	16.	20 d. 21 h. 49 m. 48 s.
	18.	9 S. 15° 50′ 50″.
164.	5.	2 lb. 0 oz. 15 pwt.
	10.	3 hhd. 22 gal. 2 qt. 1 pt.
	12.	37 bu. 0 pk. 3 qt.
	13.	16 ch. 29 bu.
	15.	1 y. 314 d. 22 h. 29 m. 59 s.
166.	22.	10 mo. 13 d.
	23.	283 y. 8 mo. 22 d.
167.	3.	107 T. 1 cwt. 0 qr. 10 lb.

Pp.	Ex.	
167.	4.	1 lb. 6 oz. 0 pwt. 20 gr.
	5.	74 lb. 0 oz. 13 pwt. 13 gr.
	7.	17 m. 6 fur. 20 rd.
	12.	50 bu. 2 pk. 4 qt.
	13.	705 wk. 1 d. 1 h. 58 m.
168.	16.	57 h. 48 m. 30 s.
169.	3.	1 cwt. 3 qr. $17\frac{3}{7}$ lb.
	7.	16 yd. 1 ft.
	9.	70 A. 2 R. 14 P.
170.	14.	5 C. 32 cu. ft.
171.	1.	1586 lb.
	6.	18 yd. 2 qr. 2 na.

PERCENTAGE.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
174.	3.	.09	177.	3.	5 %	181.	4.	$10\frac{2}{25}$ %
	6.	.001		4.	6 %	183.	3.	\$10.47+
	9.	1.15		5.	$16\frac{2}{3}$ %		6.	\$24.38
	12.	$\frac{1}{2}$		7.	20 %		9.	\$84.01
	15.	$\frac{9}{10}$		8.	12 %		12.	\$126.00
	18.	$1\frac{1}{4}$		9.	$7\frac{5}{10}$ %	185.	5.	\$27.09
176.	4.	6.72	178.	2.	\$10.50	186.	10.	\$64.925
	5.	2.92		3.	\$32.10		14.	\$57.118
	8.	23.10		4.	\$22.25	187.	3.	\$15.01
	9.	\$83.20	180.	2.	12 %	189.	3.	\$4.25
	10.	128	181.	3.	20 %			

GENERAL REVIEW.

Pp.	Ex.		Pp.	Ex.	
189.	2.	\$520, gain	191.	24.	.937+
	3.	929		26.	1 T. 14 cwt. 2 qr.
	6.	135 ; 238		28.	\$17600
190.	7.	56		30.	120
	11.	10		31.	$\frac{15}{16}$
	13.	3, 5, 7, and 13		32.	25 %
	20.	3 mo. 16 d.		34.	.01
191.	22.	$\$20\frac{9}{16}$	192.	37.	\$360

Pp.	Ex.		Pp.	Ex.	
192.	45.	$15	193.	57.	$21.90
	46.	$153\frac{1}{13}$		59.	$40.50
	47.	$852\frac{1}{2}$	194.	62.	$900
	48.	$.10		63.	13
193.	49.	$81\frac{4}{5}$		65.	$45 and hat
	50.	$.48		66.	40

DICTATION EXERCISES.

ADDITION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
201.	1.	972	201.	10.	9202	202.	19.	112847
	2.	1167		11.	7836		20.	87681
	3.	1553		12.	7551		21.	22553
	4.	2213		13.	5688		22.	44142
	5.	1139	202.	14.	10722		23.	89936
	6.	2642		15.	74970		24.	200528 156631
	7.	1638		16.	151426			
	8.	4425		17.	39931			
	9.	6108		18.	80110			

SUBTRACTION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
202.	1.	284	202.	13.	688	202.	25.	769
	2.	204		14.	295		26.	95
	3.	271		15.	283		27.	692
	4.	191		16.	90		28.	28
	5.	303		17.	181		29.	801
	6.	289		18.	269		30.	108
	7.	91		19.	34		31.	485
	8.	77		20.	122		32.	792
	9.	87		21.	422		33.	48989
	10.	103		22.	98		34.	46482
	11.	386		23.	801		35.	8133
	12.	402		24.	377		36.	7636

MULTIPLICATION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
202.	1.	21373	202.	16.	1207	202.	31.	2848965
	2.	273		17.	114513		32.	11550
	3.	12441		18.	7462		33.	4163434
	4.	469		19.	84721		34.	62700
	5.	39648		20.	10086		35.	4485349
	6.	341		21.	33793		36.	58200
	7.	35518		22.	3922		37.	2233 6608 3996 8789
	8.	364		23.	38107			
	9.	27124		24.	3478			
	10.	5211		25.	1704066			
	11.	256076		26.	24492	203.	38.	2613 2064 35319 8591
	12.	549		27.	979994			
	13.	36707		28.	41588			
	14.	2057		29.	1020328			
	15.	625		30.	32250			

DIVISION.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
203.	1.	632	203.	12.	9	203.	23.	$31\frac{441}{1000}$
	2.	412		13.	$86\frac{11}{17}$		24.	$39\frac{1229}{2003}$
	3.	913		14.	$250\frac{5}{15}$		25.	$134\frac{2}{5}$ $432\frac{3}{4}$ $3261\frac{2}{3}$ $128\frac{4}{7}$
	4.	721		15.	$52\frac{4}{16}$			
	5.	937		16.	81			
	6.	552		17.	$10\frac{40}{310}$			
	7.	1775		18.	$34\frac{218}{331}$		26.	$241\frac{7}{13}$ $1147\frac{2}{10}$ $401\frac{24}{31}$
	8.	1222		19.	$655\frac{10}{19}$			
	9.	$51\frac{10}{13}$		20.	$139\frac{45}{46}$			
	10.	$163\frac{1}{10}$		21.	$186\frac{59}{78}$			
	11.	$315\frac{20}{31}$		22.	$7554\frac{97}{121}$			

COMPOUND NUMBERS.

Pp.	Ex.	
203.	1.	3710 lb.
	2.	5120 gr.
	3.	$256\frac{1}{2}$ ft.
	4.	751410 sq. ft.
	5.	426 cu. ft.
	6.	539 pt.
	7.	633 qt.
	8.	24726 h.
	9.	$525830''$
	10.	15 bu. 2 pk. 5 qt.
	11.	84 mi. 120 rd. 3 yd. 2 ft.
	12.	5 A. 147 sq. rd.
	13.	13 rd. 9 ft. 6 in.
	14.	64 sq. rd.
	15.	$2705\frac{25}{27}$ cu. yd.
	16.	15 h. 47 min. 40 sec.
	17.	189 hhd.
	18.	$9^\circ\ 11'\ 50''$
	19.	7 lb. 6 oz. 4 pwt.
	20.	18 mi. 281 rd. $3\frac{1}{2}$ ft.
	21.	$137^\circ\ 27'\ 7''$
	22.	3 mi. 314 rd. 4 yd. 0 ft. 6 in.
	23.	18 cwt. 77 lb. 15 oz.
	24.	101 bu. 3 pk.
	25.	187 bu. 2 pk. 4 qt.
	26.	32 A. 132 sq. rd. $9\frac{1}{2}$ yd. 52 A. 37 sq. rd. $29\frac{1}{4}$ sq. yd.
	27.	4 bu. 2 pk. 5 qt 1 pt. 100 P.
	28.	5 hhd. 7 gal. 5 qt. 6 cwt. $78\frac{8}{12}$ lb.

COMMON FRACTIONS.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
204.	1.	$4\frac{1}{3}$	204.	10.	10	204.	19.	$\frac{4}{29}$
	2.	$3\frac{1}{4}$		11.	$5\frac{3}{5}$		20.	$\frac{1}{7}$
	3.	$1\frac{43}{54}$		12.	36		21.	$\frac{3}{51}$
	4.	$10\frac{1}{8}$		13.	12		22.	16
	5.	$2\frac{2}{3}$		14.	$11\frac{1}{3}$		23.	$25\frac{1}{5}$
	6.	$\frac{1}{6}$		15.	25		24.	$7\frac{1}{9}$
	7.	$\frac{1}{10}$		16.	$\frac{1}{2}$		25.	$1\frac{5}{16}$
	8.	$\frac{9}{16}$		17.	$\frac{11}{36}$		26.	$1\frac{7}{8}$
	9.	$5\frac{3}{14}$		18.	$6\frac{8}{9}$		27.	$2\frac{9}{11}$

DECIMAL FRACTIONS.

Pp.	Ex.		Pp.	Ex.	
204.	1.	3.764	204.	9.	.0004
	2.	112.56		10.	22.763
	3.	54.505		11.	2100
	4.	8.0047		12.	8200
	5.	18.9999		13.	.9
	6.	140.80		14.	.001
	7.	.72		15.	1.44
	8.	34.56			

PERCENTAGE.

Pp.	Ex.		Pp.	Ex.		Pp.	Ex.	
204.	1.	10 bu.	204.	6.	510 T.	204.	11.	$\frac{1}{4}$
	2.	$16\frac{2}{3}$ mi.		7.	$20		12.	$12\frac{1}{2}$
	3.	7.5 yd.		8.	4		13.	$98.12
	4.	$175		9.	15		14.	$567.29
	5.	$37\frac{1}{2}$ A		10.	4		15	

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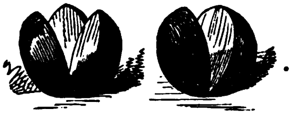

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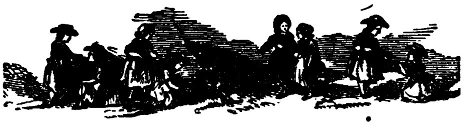

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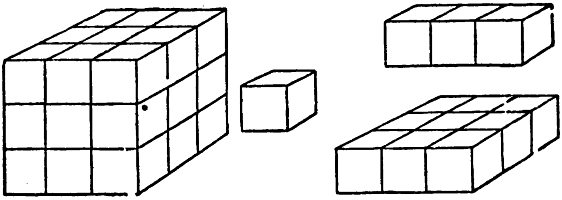

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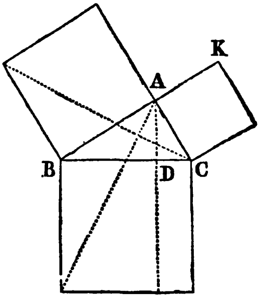

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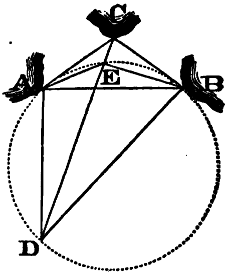

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CHAS. FRENCH, A. M., Principal.

Grammar School, No. 35, New York, Jan. 18, 1867.

Having examined with considerable care Greenleaf's New Practical Arithmetic, I have concluded to use it in my own school and recommend it to my friends, who are principals of other schools. Its definitions and principles are clear, concise, and accurate; its examples well chosen and in number sufficient to impress the subject on the mind of the scholar. In my examinations and reviews, *I have preferred* Greenleaf's Arithmetic *as a text-book to all others;* because, in addition to its Mathematical excellence, it is well adapted to all commercial purposes.

THOMAS HUNTER, Principal.

Grammar School, No. 40, New York, Nov. 26, 1866.

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Principal of High School, Lynn, Mass.

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